THE JOURNAL OF GAS LIGHTING
WATER SUPPLY & SANITARY IMPROVEMENT

VOL. LXXIV. No. 1900.] LONDON, OCTOBER 10, 1899. [51ST YEAR. PRICE 6d.

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(Maker to the Admiralty),
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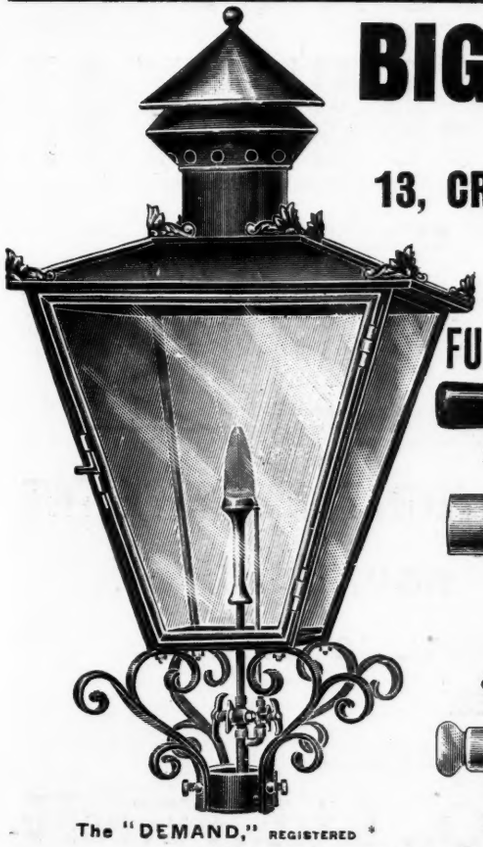

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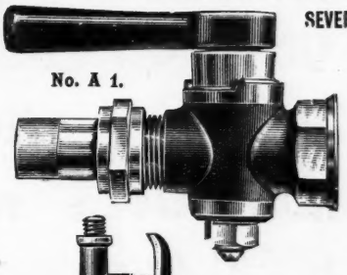

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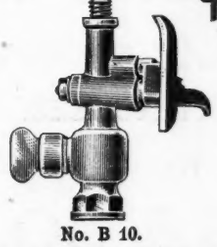
LANTERN TAPS.



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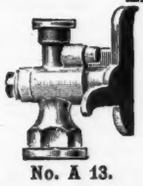

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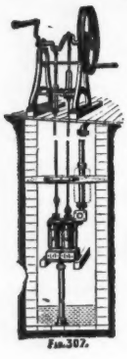

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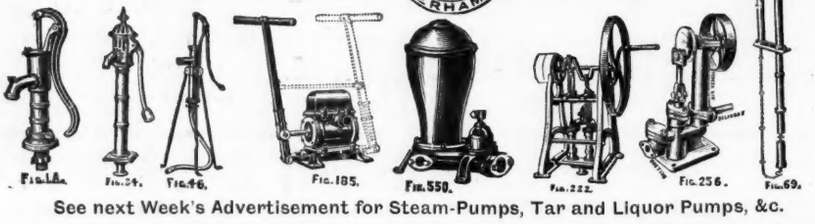

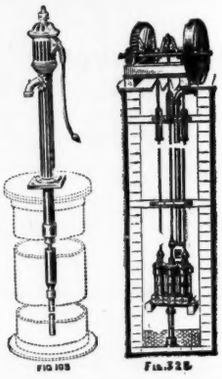

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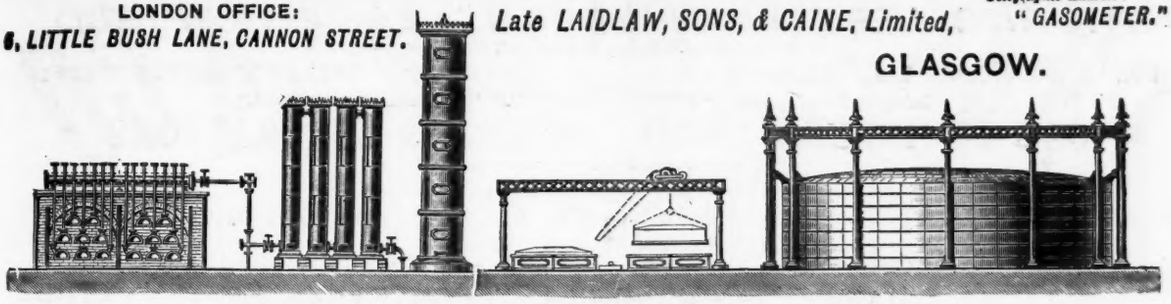

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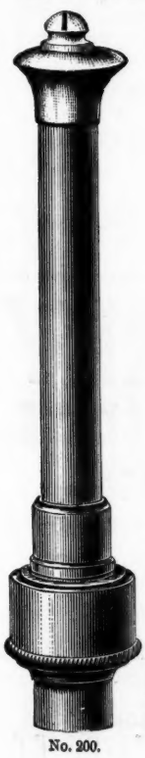

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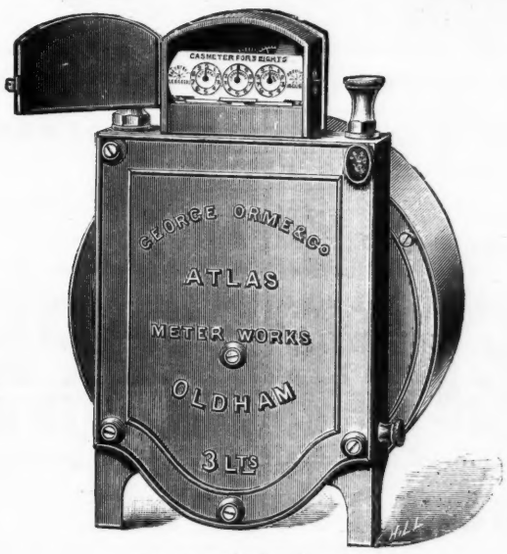

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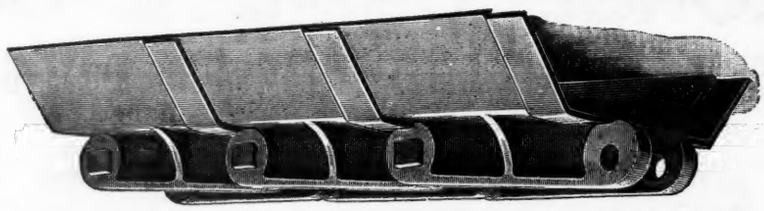

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NEW

WELSBACH BURNERS

25 Candles per Cubic Foot of Gas.

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For Street Lighting the sizes recommended are—

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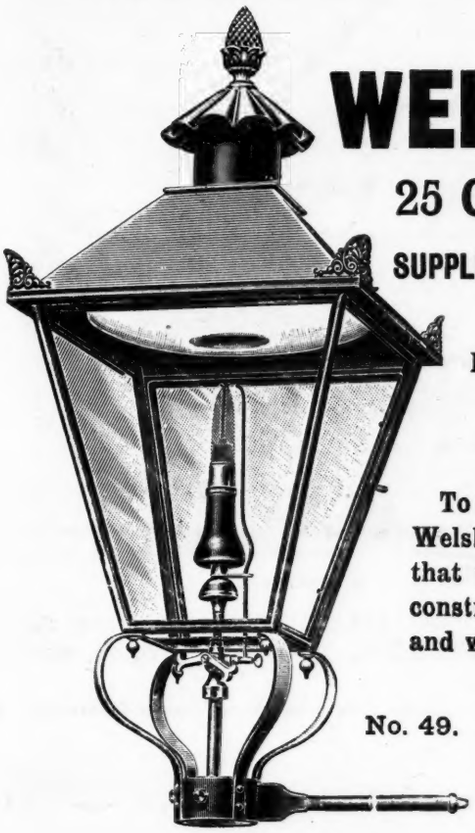

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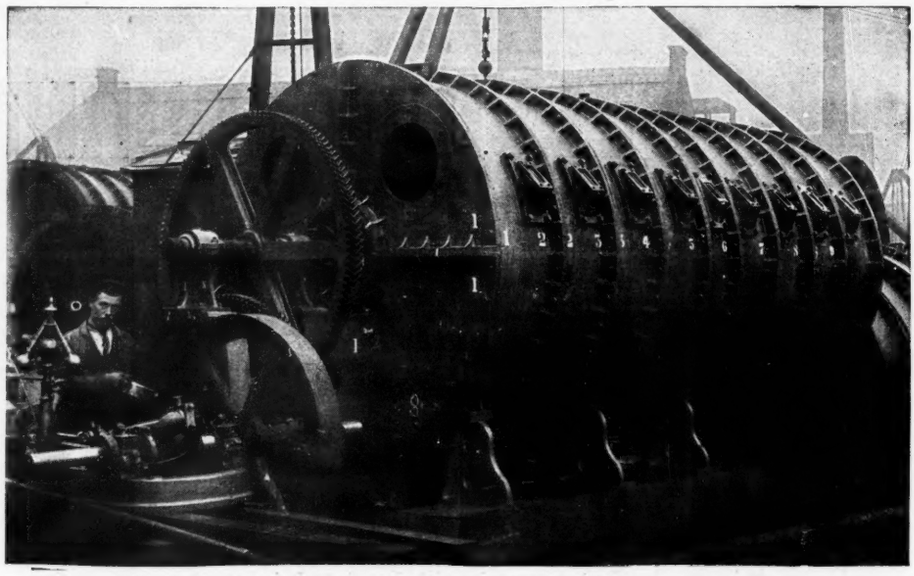

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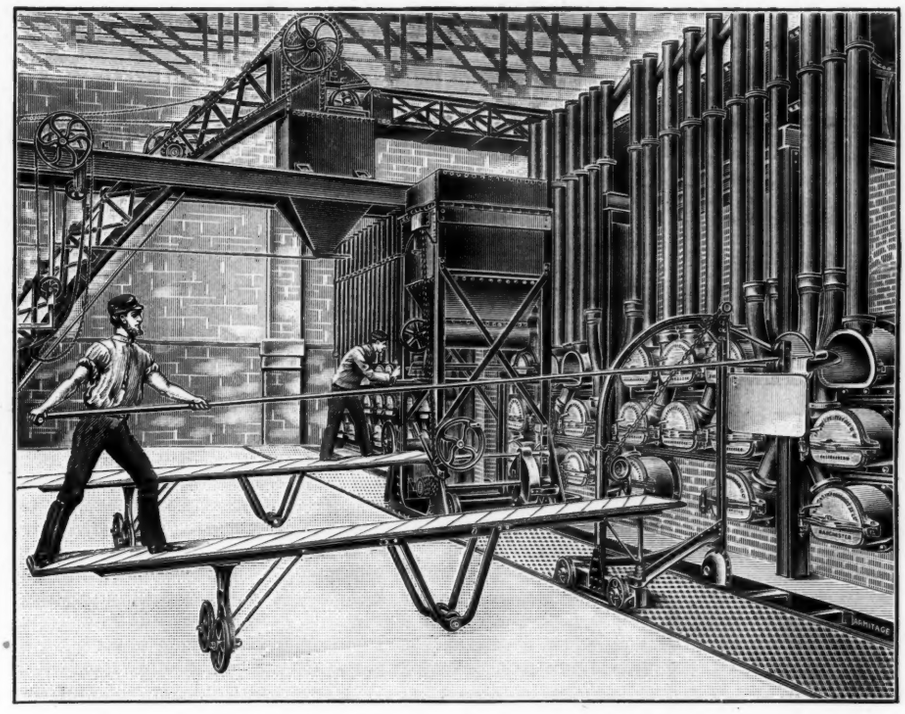

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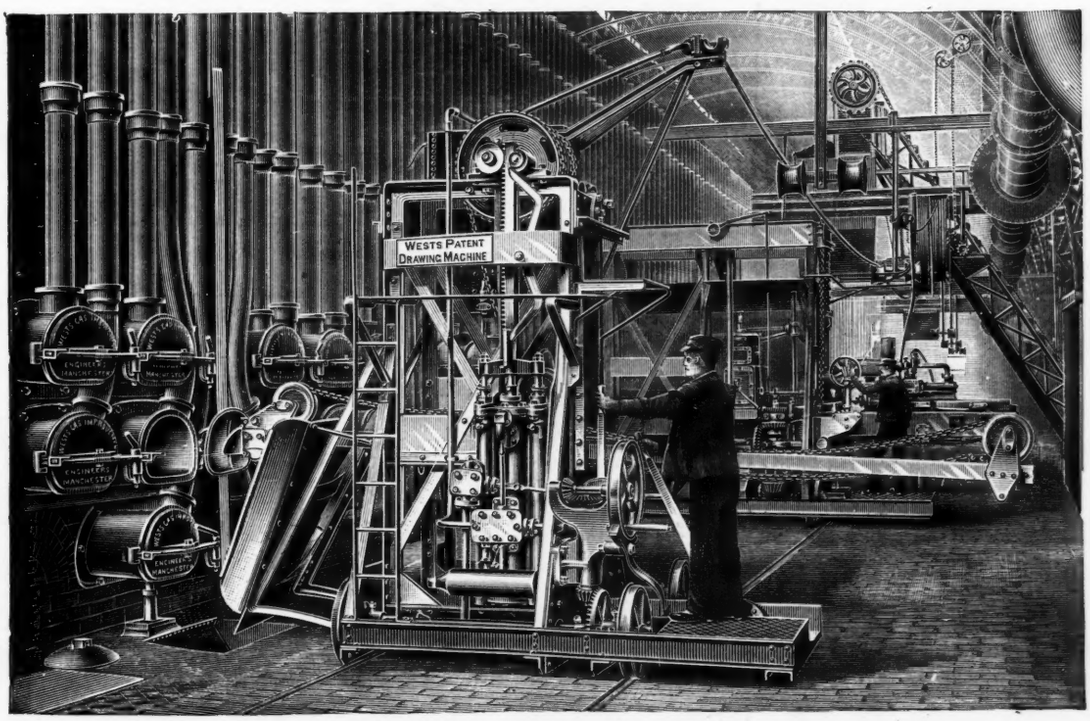

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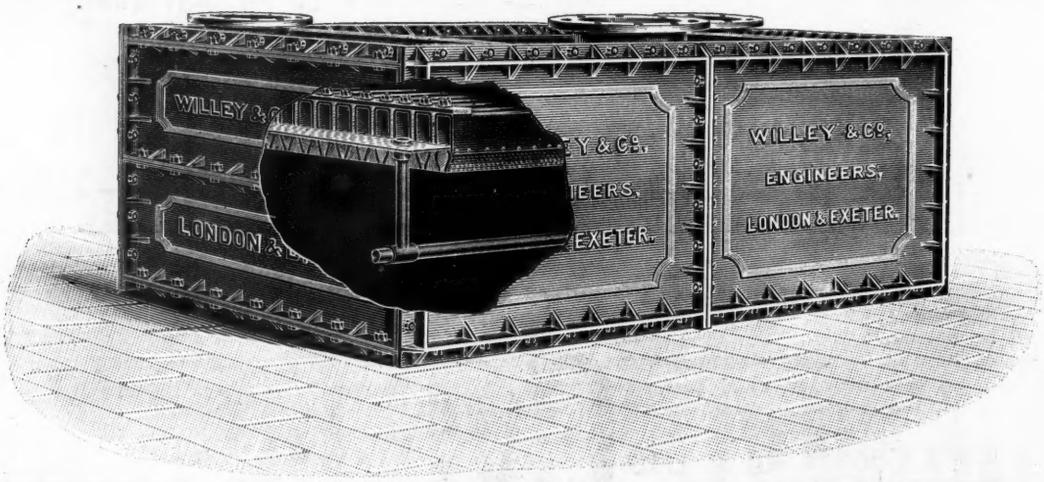

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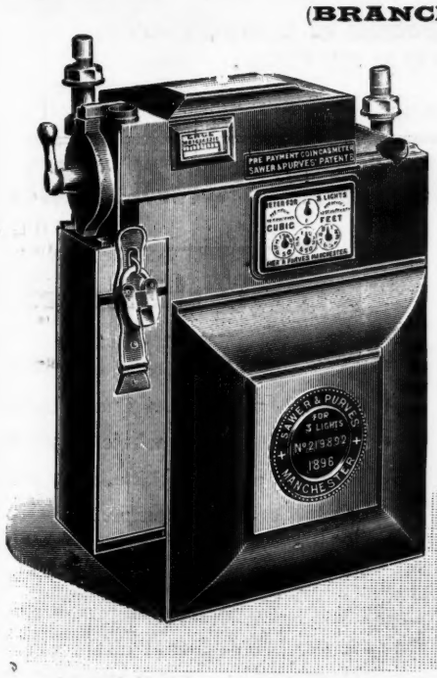

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SIMPLICITY IN MECHANISM

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PRICE OF GAS EASILY CHANGED.

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Guaranteed to give Record Results alike in Productive Capacity, Durability, Economy of Fuel, General Simplicity of Management.

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Analysis: 12,600 Feet of 19-Candle Gas per Ton.

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TESTIMONIAL

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H. KIRKHAM, Esq.

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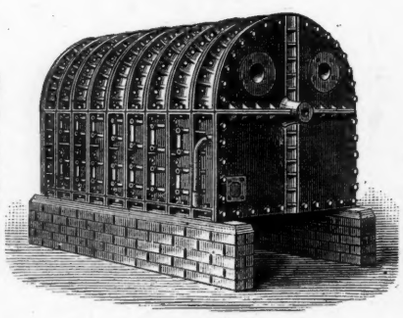
Should you wish further details, I will forward them.

I am, dear Sir, yours truly,
RAPHAEL HERRING, Engineer.



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Estimates given for a complete set of Segments for one wheel, or for refitting the whole number of wheels in a machine, also for Washer-Scrubbers complete.

The Scrubbing Devices are metal scrolls fixed in cages of segmental form, which can be readily and successively removed from the wheels through a manhole on the top or side of the machine, and the enclosed Scrubbing Devices taken out, cleaned, and replaced without the delay that necessarily takes place when the entire scrubbing material of the whole wheel has to be dealt with in one operation—thus effecting an important saving in time and labour. These Cages can be applied to the wheels of any machines of the type shown, and will increase their efficiency above 20 per cent.

The Scrubbing Devices are unequalled for extracting the whole of the Ammonia and a very large proportion of the Carbonic Acid and Sulphuretted Hydrogen from the Gas; and, if required, the strength of the Ammoniacal Liquor can be worked up to 30 oz. and above, which greatly reduces the quantity of Oxide or Lime, and also the amount of Labour for Purification.

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"CERBERUS" CONDENSING STOVE, No. 1094.

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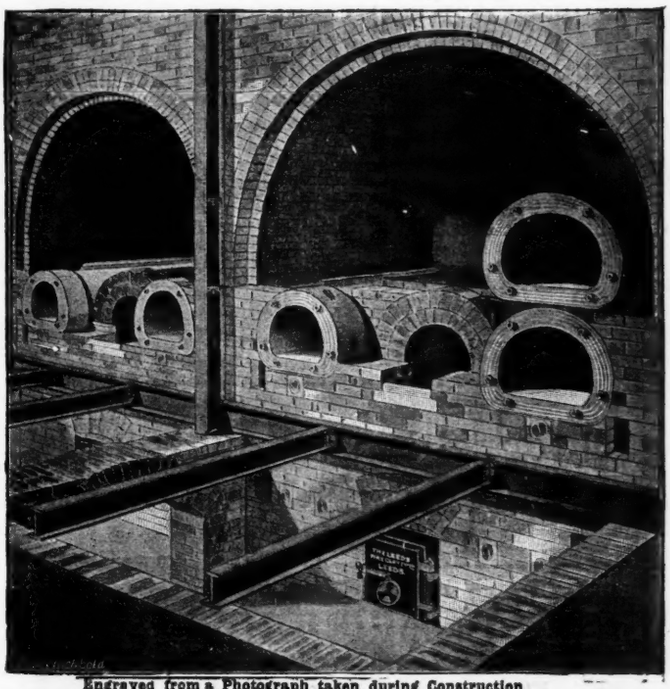

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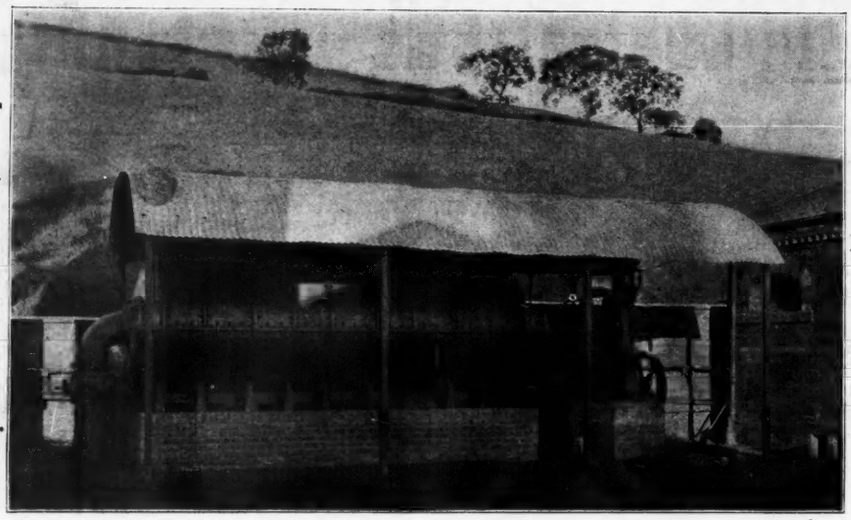

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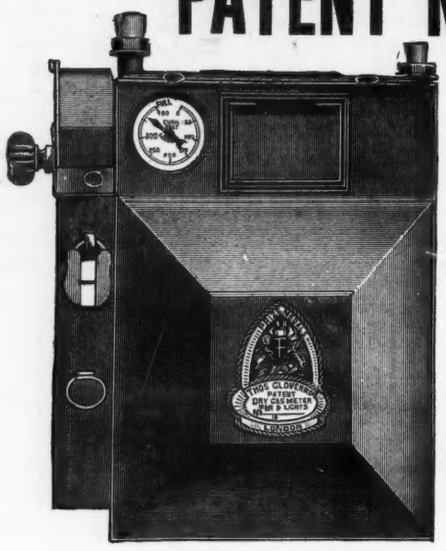

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TO CORRESPONDENTS.

No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a proof of good faith.

EDITORIAL NOTES.

The Parliamentary Precedents of Last Session.

WITH the present issue, we complete our customary abstract of the Private Gas Acts of the year. Those of our readers who are particularly concerned to follow up parliamentary precedents will be able to detect, in our necessarily much condensed summary, several points of special interest. With regard to the treatment of Gas Companies' capital powers by Parliamentary Committees, it appears that a more liberal spirit has prevailed this year when anything like a good case for large additional issues could be shown. The Committees, that is to say, have dropped the stupid old rule of cutting down new capital as it were upon general principles. Several important undertakings actually obtained as much as was asked for. The Bristol Company applied for £300,000, and the request was granted. The Hastings and St. Leonards Company asked for £250,000, and got it. Lea Bridge was similarly treated. This makes for candour on the part of petitioners. The borrowing powers of established Companies are freely increased to one-third part of the amount of new general stock issues. Stock conversion and consolidation schemes are much in evidence; and Parliament apparently has no objection to operations of this nature, so long as they are mere re-classifications of old capital actually issued and paid up. Old 10 per cent. capital will be converted into 5 per cent. nominal stock, and so forth, on request. But there are indications that Parliament will not permit any such operation to automatically expand the borrowing powers. It has been suggested that when original capital stock is doubled or trebled in nominal amount, the corresponding borrowing proportion will apply to the larger figure as it did to the original sum; but, in the case of Shotley Bridge, this inference was expressly forbidden. Here an actual capital amounting to £30,000, divided into three classes of stock and shares, was consolidated and converted into the equivalent nominal amount of £51,000 of 5 per cent. stock. There was an old mortgage debt of £6000. By the new Act, the borrowing powers in respect of the original capital are £10,000, to include the £6000 already borrowed—that is to say, the proportion of one-third loan capital refers to the actual capital subscribed, not to the equivalent amount on conversion. In the Lea Bridge case, it is expressly directed that "the amount "which the Company may carry to their insurance fund "in respect of their paid-up capital represented by the "shares so consolidated and converted shall not be affected "by reason of such consolidation and conversion." It therefore seems evident that, while Parliament is willing to permit Gas Companies to convert their old capital bearing high dividends into equivalent nominal amounts of stock bearing low dividends, the operation does not extend to, or consequentially affect, the old capital relations with the borrowing powers, reserve, or insurance fund. Reasonably so, because it is the sum representing the dividend that is directly answerable for all these prior charges. It is not healthy finance to reduce excessively the ratio of dividend to interest charge.

It is becoming rather fashionable for small Gas Companies to take powers for the Directors to declare interim dividends without calling the proprietors together, under stated conditions. A curious effect of the agitation of last session over the question of municipal or monopolistic trading is shown in the clause in the Acts which gives those Companies and Local Authorities not previously so equipped, powers to supply gas apparatus to their consumers. Into the middle of the usual and, one must believe, necessary verbiage authorizing the Company or the Corporation to "purchase, provide, supply, sell, let "for hire or on hire-purchase, use, and otherwise deal in, "fit up, alter, repair, remove, and refix" fittings, there is either inserted the words "but shall not manufacture" these articles, or the express permission to manufacture is significantly omitted. The Hastings Act says that "nothing in "this section shall empower the Company to manufacture "articles and fittings." This prohibition is therefore the law, as applied to those gas undertakings which happened to be in Parliament while this fit was on; and it is impossible to avoid the conclusion that once more the opinion of the immortal Bumble respecting the intellectual aspect of the law is justified thereby. Compare this stupid restriction with the carefully weighed protest of Mr. H. E. Jones against the concerted putting up of manufacturers' prices

for gas-works supplies, reported in another column to-day. There is a very pointed personal insinuation in these remarks of the Engineer of the Commercial Gas Company, which will not miss its object, and therefore need not be sharpened by anything we could add. Mr. Jones has said something that will rankle and fret, as it was meant to do. Apart altogether from this personal innuendo, what is there to be gained by the legislative disarmament of gas undertakings in face of their natural enemies—the ring-making manufacturers? How long ago is it—to cite only one instance in this connection—that the South Metropolitan Gas Company had to threaten to make their own meters? This prohibition of manufacturing articles for their own use, slipped into last session's Acts, will prove extremely mischievous, if it does not become a dead letter. It is a very bad example of the parliamentary vice of bowing to "fads." We have no objection to the spirit of the revolt against the extension of monopolistic trading, of which this novel rule of Parliament—if it is a rule—is the first outcome; but the proscription of manufacturing, while trading is permitted, is a sad blunder.

There is not much else to be said about the novelties of this year's Acts. The extension of gas suppliers' responsibility to gas beyond the meter, has already been commented on; and we have applauded the strong lead of the Bristol Gas Company in this matter. Legislation restricting the period of error in the case of defective consumers' meters has taken a more rational turn than it had at first. Still, the customary clause is not quite clear. This enactment runs that "the erroneous registration shall be deemed to "have first arisen *during* the then last preceding quarter "of the year, unless it be proved to have first arisen during "the current quarter." There is an opportunity for dispute in the italicized word. The beginning, the middle, and the end of the quarter are all in it. The thoughtful Scot has supplied the correction of this looseness of expression; for the Glasgow Corporation (Gas and Water) Act states that, in such event, the "incorrect registration shall "be deemed to have first arisen at the beginning of the "period for which the last account for gas consumed was "rendered, unless it be proved to have first arisen subse-"quently." This is better. It is gratifying to see that in most Gas Transfer Acts the interests of compulsorily-retired officers and workmen are now fairly safeguarded. We certainly think, however, that Parliament ought to take a little more thought about the period of redemption stipulated for gas purchase and extension loans. Forty years is as much too short a period for this financial operation as a century is too long. Some Local Authorities get thirty years' time for wiping off their "working capital," while others must do this in ten years! One or the other condition must be unreasonable. As usual, the finances of Scottish municipalized gas undertakings are far better ordered than those of English concerns of the kind.

The Affairs and Prospects of the Commercial Gas Company.

THE meeting of the Commercial Gas Company last Thursday was rendered an important occasion by the force of circumstances. Mr. J. Blacket Gill, the Chairman of the Company, presided, supported by the full strength of the somewhat exceptional combination of directorial talent associated in the administration of this smallest of the London Gas Companies. There was nothing very noteworthy to be said respecting the half-year's working, which was not so remarkably good, in reality. The economical result of the adoption of carburetted water-gas plant is not strikingly evident from the revenue account; but there are doubtless other recommendations of the new system of gas making to be found in the saving of capital and the circumventing of the labour conspiracy. The chief interest of the meeting lay in the candid remarks of the Chairman on the condition of the undertaking as regards capital, and the discussion across the table of the bearing upon the Company of the findings of the Powers of Charge Committee. The Chairman, and his colleagues individually—he was careful to guard himself from being taken as the mouthpiece of the Board—have at length come to the conclusion that the Company's statutory privilege of issuing fresh capital to the proprietors at par is an onerous burden. Unconsciously, Mr. Gill thus bore witness to the wisdom of the Powers of Charge Committee's observation as to the inexpediency of giving Gas Companies too long a tether. The Commercial Gas Company were last in Parliament in 1875; and now they have found out that what was regarded as a stroke of luck at that period has now become a disadvantage. The proprietors were just in time to get the latest Act permitting the allotment to themselves of fresh capital at par. For some years they thought themselves very lucky; but the privilege lasted rather too long. For a considerable time it has been evident that there is another side to this picture of the Happy Shareholder. His privilege meant that those who had the responsibility of managing the business were placed under the obligation to work with capital correspondingly dear. All the time that other Metropolitan gas undertakings have been able to extend their business with capital costing on the average 4 per cent.—share and loan together—the Commercial capital has cost every penny of 7 per cent., and more. There is not a People's Draper or a cutting tobacconist in the East-end who cannot get cheaper capital on mortgage. This has long been evident to observers of the affairs of the London Gas Companies; but hitherto the Commercial Directors have naturally been reluctant to advise the proprietors to relinquish one of the undoubted private advantages of their statutory position. The Board have regarded themselves as guardians of the rights of individual shareholders, as well as administrators of the business of the Company. Until the present year, the two interests, of the proprietary and the undertaking, preserved the appearance of differing; and this was the Directors' excuse for remaining neutral. Nevertheless, the Board proved that they knew well enough where the shoe pinched, by keeping the capital account as far as possible closed. Thus, although the proprietors' right to par issues of fresh capital was not impugned, the Board took good care it did not operate much or often.

A right which is allowed to fall into desuetude is on the way to extinction. The right of the Commercial stockholders was not moribund; but it was rarely exercised, and then only with the greatest reluctance of the Administration, who heartily disapproved of it. Upon this state of things came the Powers of Charge Committee, with their concentration of attention upon the selling prices of the London Gas Companies. The Commercial Gas Company came before the Committee with no complaint against them; but they were not selling the cheapest gas in London. Why not? For several reasons, as stated by Mr. H. E. Jones, the Engineer and General Manager of the Company, in his evidence. The obligation to issue fresh capital at par was appraised by this competent witness at 1½d. per 1000 cubic feet of gas sold. It is a heavy burden; and the report of the Committee furnished the Directors with the opportunity they required for asking the proprietors to give up their privilege, albeit at the eleventh hour. The report furnished the Board with the additional argument that by allowing the remainder of the unissued stock and loan capital to be sold at a premium for the benefit of the undertaking, the proprietors would enable the Company to keep out of Parliament for an indefinite period. Nobody knows what Parliament would do with the Company; but if the advice of the Powers of Charge Committee is taken, the Company will on the first opportunity suffer a reduction of the initial price of 1875. The official counsel of the Board was to postpone the evil day of parliamentary revision as long as possible.

On the other hand, Mr. Livesey advised the Company to go to Parliament, while they have something to yield, in the hope of getting a *quid pro quo*. Besides, a Bill would be of the nature of a trial balloon, to see how the parliamentary wind blew. Mr. Gill thanked Mr. Livesey for his advice, but did not see why the Commercial Company should send up a balloon before they were compelled, in order that others might take advantage of the same breeze. "Let somebody else have a try!" said Mr. Gill, with (metaphorically speaking) one eye across the River, and the other upon the Horseferry Road. His was the prudent advice; Mr. Livesey's was the adventurous counsel. There is the consideration, in this connection, that Mr. Livesey is in a position to test his own prescription, if he dares. The recommendations of the Powers of Charge Committee are far more to the advantage of the South Metropolitan than to the other London Companies. Will the South Metropolitan try how Parliament regards them? Again, there is force in the Commercial observation that Parliament is not unmindful of the accomplished fact; so that if the Company give up their unique privilege now, the record will stand to their credit when they do go

to Parliament, just the same as if they were to go with the engagement in their hand to relinquish it. On the whole, we incline to the opinion that the Commercial view is the correct one, for the Company. They were not exactly the principals in the late investigation. It is not their place to rush in and ask Parliament to legislate for them as a consequence of the Committee's findings. The waiting game is theirs. No doubt there will be "wigs on the green" before all the issues raised by the Committee's report are settled; but these need not be of the Stepney make.

The North of England Association Meeting.

THE members of the North of England Gas Managers' Association came out in force to their half-yearly meeting in Newcastle last Saturday. It is not every day that the opportunity is offered of the inspection of a large new gas-works; and this being promised at Newcastle, members and their colleagues from far and near flocked to the scene. Moreover, the appetite for this particular sight-seeing had been whetted by the paper which Mr. W. Doig Gibb, the Engineer of the works, read at the spring meeting, in which he described a number of highly ingenious arrangements which he has made at the Redheugh Gas-Works. The fulfilment was in every way equal to the promise. Of the retort-house it may be said that "sweetness and "light" are its characteristics. The usual accompaniments of retort-house working—smoke, heat, dust, and noise—were noticeably absent; this being due, without doubt, to the ample space, the style of settings adopted, and the magnificent coal-handling plant fitted up. These and other things were noted, in this and other parts of the works, by the company, most of whom returned from the visit with the feeling that they had been privileged to take part in a ceremony of great educational value. The observant eye is probably a better medium of instruction than is the attentive ear; and the visitation of works in active operation is the most approved method of affording means of observation. That they are alive to this fact in the North of England, was shown by the abnormal attendance at Redheugh. The Association meeting was presided over by Mr. Gibb, one of the youngest members, who may be said to have already won his spurs in the world of gas supply. But while honouring deserving youth, the Association do not forget ripened worth. It was a fine sentiment—almost a touch of pathos—which underlay the resolution to present, in tasteful form, the congratulations of the Association to two such revered fathers of the profession as Mr. J. H. Cox, of Sunderland, and Mr. Charles Sellers, of York, on their completion of fifty years' service with their respective Companies. How many Associations could produce such an incident? While it has been known in a general way that the post of gas engineer and manager has become one requiring high intellectual attainments, it will probably somewhat startle most people to read the long list of subjects which the President, in his Inaugural Address, said he considers a student should take when preparing himself for his life-work. Mr. Gibb anticipates that his views upon the subject of training may not meet with general acceptance. He is probably correct; but, whether accepted or not, he has made it clear that to the post of gas manager there is, at least now, no royal road. His remarks are worthy of being well pondered over by all who are proposing to go in for gas engineering. The address was, indeed, a thoughtful one throughout. So much time having been taken up visiting the works, there was not sufficient left for the discussion of Mr. Millard's paper on governors. The paper was a gathering together of information upon just such a question as almost everyone considers himself to have solved; and if the discussion had gone on, it would probably have been a lively one, as the paper itself was.

Mutual Schemes Under the Compensation Act.

THE statistics given to-day, p. 876, from the report of the Registrar of Friendly Societies on the number of mutual schemes (in lieu of the provisions of the Workmen's Compensation Act) certified by him up to Dec. 31 last, do not give evidence of any great desire upon the part of employers to meet in this way their obligations under the Act. The Act had then, it is true, only been in force six months, and (the average time elapsing between the date of application for and the date of the issuing of a certificate being about six weeks) some schemes submitted before the end of the year are not included in the report. Yet, on the other hand, employers had had the provisions of the Act before them for close upon twelve months prior to its coming into force, and had as early as the previous November been invited to submit schemes to the Registrar on and after Jan. 1, 1898. Taking these facts into consideration, it is disappointing—to those who, like the "JOURNAL," hold that the adoption of a mutual scheme is the plan for meeting the liabilities imposed upon employers by the Act most advantageous to all concerned—to find that the Registrar had, on Dec. 31 last, only certified some fifty-five schemes, having reference to undertakings employing rather less than 100,000 workpeople. Out of this number, thirty-eight schemes related to collieries, involving about 36,000 miners; two were submitted by railway companies, employing together 37,396 men (elsewhere tabulated as 34,933), while the sole representative of the gas industry was the South Metropolitan Company, returned as employing 3815 workmen.

From these figures it is obvious that the great majority of the employers affected by the Act have, up to the present, preferred either to insure against their liability or to take their own risks. The former is, we know, the course adopted by the North of England Gas Companies; while the Gaslight and Coke Company is the most important undertaking to follow the latter. It would be interesting to have complete information as to the course adopted by each and all of the gas undertakings in the country, and, at the end of (say) five years, to obtain and compare particulars of their several experiences. There is, however, one most important factor as to which no statistics are, or ever can be, available—that is the sentiment, friendly or the reverse, of the men themselves towards the plan adopted for providing the compensation to which they are entitled, and the effect—incalculable, but none the less real—upon the dividends of a company of the relations in this way engendered between it and its employees.

The fact that a mutual scheme is eminently calculated to promote smooth working between the men and their employers, by the automatic and non-contentious provision of compensation, is the chief among other considerations, which we have previously set forth at some length, that have led the "JOURNAL" to regard such schemes as more advisable than the plan of insurance. The fact that an unspoken but rankling discontent among the men is a fruitful cause of trouble and loss to a company—though the trouble may break out, with a seemingly unaccountable bitterness, over some apparently trivial incident quite unconnected with the original source, and the loss be almost untraceable, but, for all that, quite appreciable—should render those responsible for the direction of a company most careful to ascertain beforehand the real attitude of the men towards any scheme they have in mind, and, subsequent to its adoption, to make certain that it really induces harmonious working. For what the eye does not see nor the ear hear (for want of looking and listening aright), the pocket has often to pay. This is not written unadvisedly; for we know of at least one company—which we have no intention of naming—where the arrangements for providing accident compensation are sowing seeds of discontent that will surely bring forth a tenfold harvest of trouble and impoverishment.

Evidence is not wanting that employers generally are insuring against their liability. The accounts of the Insurance Companies are eloquent of the fact; while we note that at the last general meeting of the Ocean Accident Corporation, the Chairman declared that among the difficulties with which his Board had had to contend was "the increase in competition arising from expectations "of great profit from the Workmen's Compensation Act. "This is shown by the fact that, in the year 1898, more "new insurance companies were registered in Great "Britain than at any time in the half century previous. "The number was ninety-five. Of that number no less "than fifty-one were projected to transact this class of "insurance." It is perhaps almost superfluous to say that these fifty-one companies, as well as the previously existing concerns, are not philanthropic institutions. They exist to make profit; the employer who insures has to provide it. A mutual scheme does not maintain any third party.

An "Innocent" on Illicit Commissions.

EVERY now and again, when skimming the editorial columns of the best daily newspapers, one receives a shock at the contact of matter which can only have emanated, one would suppose, from the callow university graduate

or the lady journalist—from somebody, at any rate, who has no acquaintance with the every-day world. It is so funny, in the midst of much that is in the highest degree practical and informing, to meet with these artless observations respecting the commonplaces of ordinary life. One day last week, the "Daily News" had such a paragraph upon the discussion of "Secret Commissions" at a conference of the "Commercial Travellers' Christian Associa-"tion." The interested writer, to whom the subject was evidently new, opined that the evil is a "growing" one; and that "we are fast hardening in the belief that the secret "commission has no moral aspect, and involves no stain "upon character. It will soon," he (or she, for the style is most distinctly ladylike) went on to say, "become one "of those things which everybody understands, and which "nobody says a word about. When that state of things "arises"—and so on. Why, bless its innocent heart! Where has the "Daily News" been living all these years? It goes on to babble of the "complexion" to which we must come at last, "if the commercial travellers cannot "cut the canker out of their own system." The truth of the matter is, as everybody ought to know, that it is with the commercial travellers, regarded as representing the "personal element" in trade, that the last survival of a once universal system of influencing business is to be found. Once upon a time, indeed, it could be said that "they all did it" in this country, just as they do it now all over the world. Infants really ought to be kept from printers' ink. There is still too much of the "personal "element" in British trade; but the more mischievous operation of this element is not on the increase. On the contrary, it would be unjust not to recognize the tremendous efforts made by individuals of late years to keep business in clean hands. Englishmen have gone far in this endeavour; while the traders of some other nationalities have not so much as started on it. It is necessary in regard to this matter, of all others, that those who speak of it should clear their minds from cant. It is likewise desirable that they should know what they are talking about. But this is a "counsel of perfection," so far as newspaper writers are concerned; for there would not be much journalism, unless the journalist were permitted to pick up his knowledge as he goes along.

How the Danish Strike Ended.

One of the incidental fruits of the gas engineers' pilgrimage to Copenhagen was a little authentic information respecting the outcome of the great strike of Danish artisans, garbled intelligence of which had been reported in the English newspapers. The subject was discussed in the "Journal" early in July. The remarkable thing about the affair was that no precise account of how it ended ever appeared in the newspapers. One very general statement was made, to the effect that the strike had resulted in the victory of the men; but shortly afterwards this was contradicted, and the men were reported to be still going about enjoying themselves in the decorous and self-respecting manner that marked their behaviour throughout. The truth of the matter is that the strike quietly "fizzled "out" with the return of the men to their work on the old terms. It really settled nothing, but lasted just so long as the accumulated funds of the Trade Unions held out—or perhaps a week longer, where the employers chose to impose a little moral quarantine. None of the great questions of principle supposed to be involved—the right of combination on both sides, or the obligation of a Federated Union to abide by the decision of the superior Board—was advanced one whit nearer final solution. The men's war-chest was depleted, and then they returned to work—that was all. If the strike proved anything at all, it is that strong Unions with well-lined cash-boxes do not make for industrial peace. Quite the contrary, the associated artisans would never have struck "for sympathy" unless they had money to spend. After they had drawn all there was to draw, and "played" as long as they cared to, the men went quietly and respectfully to their old employers, and proposed to resume work at the next week-end. As already remarked, the employers did not complicate matters by raising any awkward questions, but said in reply that the shops would be open the next week but one. The extra week was a salutary piece of discipline. But there is no finality about the lesson. The men may strike again, for the same cause, as soon as they can afford it. Such reflections are not satisfactory to either party, nor to the impartial outsider. But the facts cannot be altered; and they are as we state them, for the first time in English.

The Church and Labour.

We seek in vain in Dr. Temple's address on the Church and Labour, recently delivered at Birmingham, for the least indication of what part the Church should play, what influence she should exert, in the settlement of the many problems bound up under the general title of Labour Questions. Upon the attitude of men to masters or masters to men; upon the selfish folly of needless strife; upon the need for moderating and conciliating influences to prevent or mitigate strife—the head of the English Church has no word to say. We look for the bread of wise counsel, and we find but stony platitudes. The problems connected with the conditions of working-class life are, says Dr. Temple, serious and difficult. What then is his contribution towards their solution? We can find no word of help or guidance in the whole of a lengthy address; only a declaration that it is "the duty of the "Church to think of these problems, and endeavour to "solve them to the best of her ability," and—an elaborate argument in favour of requiring aspirants to the ministry to possess the gift of reading the Bible in the original Greek! Truly, men may wonder when the whole energies of the Church, the combined wisdom of her Archbishops, can be spent without stint upon questions of incense and ritual, while problems involving the very well-being of the Nation receive merely a perfunctory recommendation to notice. Our feeling on reading Dr. Temple's address is one of profound disappointment.

A Season of National Prosperity.

In our last issue we referred to the considerable and continuing rise in wages as a proof of the general prosperity of the country. The past week has afforded other and striking evidences of the increasing wealth and buoyant trade of the nation, which must indeed gladden the heart of the Chancellor of the Exchequer, especially at a time when the calls upon the country's resources are, and are likely to be, exceptionally heavy. The official returns of the revenue for the six months ended the 30th of September were issued during the week, and show an increase under practically every heading. Where the Chancellor estimated a good increase, he has a better; a large increase where he anticipated a small one; and where he feared a decrease, his apprehensions have proved unfounded. The net result is an augmentation in the yield of revenue of £3,482,452 over the corresponding period of last year—the total amount actually received being £53,190,586. Following upon this most satisfactory statement come the returns of the Board of Trade for the past nine months. The exports of the country during that period are valued at £194,351,197—an increase of no less than £21,622,039 over the same period in 1898; while the imports have risen by £11,424,473—being this year estimated at £356,019,390. These figures are in every respect encouraging, and afford conclusive evidence that the commercial decadence of Great Britain is yet a thing of the future. Many worthy people affect to be seriously alarmed at the great preponderance of imports over exports (the value of the one being now nearly double that of the other); and they imagine that the difference represents a drain upon the wealth of the country to pay for imported food and raw material. A little political economy is, of all partial knowledge, the most misleading. The actual fact is that we are rapidly becoming the creditor—the landlord—of the world. It is estimated that the value of British investments and property abroad amounts to something between four and five thousand millions sterling; and the excess of imports over exports, it will be seen, represents about 5 per cent. on that amount. The excess is, in fact, the dividend upon British capital invested abroad. We lend other countries capital to develop their industries; they pay us interest thereon in foodstuffs, raw materials, and other goods. The expansion of trade so plainly to be read in the figures quoted is also evidenced by the action of the Directors of the Bank of England in raising the bank-rate on Tuesday last from 3½ to 4½ per cent., and announcing a further advance to 5 per cent. within the next two days. The political situation is, of course, one ground for this sudden and substantial increase in the bank-rate; but the rise has been mainly brought about by the steadily increasing demand for capital both at home and abroad. Russia is spending money like water in the East; the commercial activity of Germany during

the past few years is matter of common knowledge; and we ourselves are full of work. Money is, therefore, now—and is likely for some time to remain—in great demand. This means a rise in money rates and a fall in gas stocks—another way in which active trade in general adversely affects the gas industry in particular.

WATER AND SANITARY AFFAIRS.

In certain respects, the address delivered by Colonel Lockwood when moving the adoption of the report at the half-yearly meeting of the East London Water Company last Thursday was similar to that of his predecessor, Mr. George Banbury, on the corresponding occasion last year. Both had to defend the Company from unwarrantable attack; and both had a story to present of difficulties successfully overcome. But it must have been with very different feelings from those experienced by the latter gentleman that Colonel Lockwood entered upon his task. Mr. Banbury had to tell the proprietors how, during a period when, as he put it, "the forces of Nature were mercilessly "against them"—or, expressed more prosaically, when they were passing through a period of almost unexampled dry weather—and they were at length compelled to resort to an intermittent service of water, they were airily told that there was "no drought," and that their own troubles and those of the unfortunate consumers were simply due to the apathy and neglect of those who had been entrusted with the management of the undertaking. He had to show how these charges were made by the very people whose obstruction in Parliament had prevented the provision of works which would have obviated much of the inconvenience suffered by the poorer class of consumers, though this was much exaggerated; and, finally, he had to complain of the malignancy displayed by a certain section of the Press in their attacks upon the Company. However, he had the gratification of acknowledging the fairness of the majority, especially the leading journal, and the cordial support and assistance the Company had received from their officers and from neighbouring Water Companies. This was the substance of Mr. Banbury's matter-of-fact story. Colonel Lockwood's was shorter and rather brighter. Although he and his colleagues had to face another drought of unusual severity, which weather-wise prophets had predicted was not likely to occur again in a decade, they were in a better position to cope with it, owing to increased storage and the "intercommunication" scheme sanctioned by the Government Act of last session. This scheme, as a matter of fact, the Company themselves initiated in 1896 as a reserve power, and succeeded in incorporating in their Act of the following year, notwithstanding the vigorous opposition of the London County Council. The timely help thus afforded fortunately saved the Company. There were plenty of people on the look-out for a breakdown; and Colonel Lockwood reiterated his predecessor's complaint as to the action of a certain class of newspapers whose publication of false reports in regard to the Company's position was calculated to do an immense amount of harm just at the time when the Directors were striving their utmost to avert a calamity. He was no doubt right in attributing some of these unfounded assertions to the wish that they might be true. Happily, the constant service which the Company instituted many years ago, and have since carried out in their vast area of supply, without the slightest compulsion, or even suggestion from any of the Local Authorities that the system should be adopted, was not interrupted. Though in the three mid-summer months the rainfall was only 4·2 inches, against an average of 8·8 inches recorded for the past 84 years, the Thames, "depleted" as it was, according to some people, did not fail; and the Lea—the "Company's own river," as Colonel Lockwood called it—behaved fairly well.

It was necessary, in order to properly set forth the Company's position, for the Chairman to go a little into "ancient history." But he was unquestionably justified in doing so. It cannot be too often repeated from the Directors' side of the table that their efforts to meet the requirements of their constantly growing district, with its 1,334,000 consumers, are continually being frustrated by the opposition encountered from one quarter. It was owing to this that the Company lost their Bill in 1893, with the result that the constant supply which they had been striving to maintain was interrupted in 1895 and the following year; and their Bill of 1894 very nearly shared the fate of its predecessor. So strongly was it opposed that it was only saved by a single vote. It may be asked: "What would the Company's opponents have gained by "its rejection?" They would have had the satisfaction of seeing them with 600 million gallons less water than they now have for distribution, and with a reserve so diminished that a partial shutting down of the service would have been necessary this season. This would have been a very gratifying spectacle to people whose actions are professedly governed solely by regard for the public welfare. Realizing from past experience the danger of their position, the Directors endeavoured to provide against a recurrence of the crisis through which they had passed; and their Bill of last session was the instrument by which they meant to attain their end. Far from being encouraged in their attempt to improve the supply of the district, the old tactics were brought to bear upon them. This is not "ancient," but very "modern" history; and therefore it is only necessary to recall to our readers' minds the circumstance of the wrecking of the Bill in the House of Lords, after it had safely passed the Commons' Committee. It is not to be wondered at that the Directors were "grieved and dis-"appointed" at the rejection of the measure, or that their Lordships' decision caused "universal surprise." Nothing daunted, they purpose re-introducing it next session, it is to be hoped with more success, for this parliamentary business entails heavy expenditure—no less than £3480 figuring in the current accounts as the expenses attending the loss of the Bill. Colonel Lockwood, however, very promptly, in a letter to the papers, put upon the right shoulders the responsibility for this waste of money, and—what is of far more consequence to the community dependent upon the Company for the supply of one of the most important necessaries of life—the stoppage of works required to ensure the continuity of the service; and he and his colleagues have had the intense gratification of seeing the Local Government Board add to the burden of that responsibility the weight of their official censure. Whatever criticism may be passed upon the Company in the future for any shortcomings in respect of their supply resulting from inadequate works, will be fully answered by Colonel Lockwood's letter and the correspondence to which he directed the shareholders' attention.

As to the future of the London Water Companies generally, Colonel Lockwood, of course, could not speak. The final report of the Royal Commission is still under consideration; and therefore it is idle to speculate as to what its recommendations may be. One thing, however, is perfectly certain, as he pointed out, that the two rivers and the other sources of the existing supply will have to be solely depended upon for some years to come; and even in the event of water from a distant source being eventually brought to the Metropolis, the present works, and the additions which must be made thereto in the interim, will always be valuable portions of the entire scheme. It was doubtless with this conviction that the Directors resolved, as already mentioned, to test the feeling of Parliament once again on the subject of their additional reservoirs; and it is gratifying to find that the decision has received the unequivocal support of the highest authority on the subject in the realm. As far as the financial position of the Company is concerned, they are able to pay a dividend at the rate of 7 per cent. per annum and carry forward a balance of £12,717. This is £14,283 less than at the corresponding time last year. But, as the Chairman pointed out, there have been heavy expenses, especially in Parliament and on account of the Royal Commission; and they have had to be met. During the past half year a large quantity of main-laying was carried out, and the pumping plant was strengthened; while the reservoirs sanctioned by the Act of 1897 are in active progress. These works are evidence that the Directors are keenly alive to the necessity for having plant fully equal to the demands upon it; and they only require a free hand to carry out such extensions and additions as they may be advised are needed to bring it into that condition.

Midland Association of Gas Managers.—The autumn general meeting of this Association will be held at Birmingham on the 26th inst., under the presidency of Mr. J. S. Reeves, of Bilston.

ESSAYS, COMMENTARIES, AND REVIEWS.

GAS AND WATER COMPANIES IN THE STOCK MARKET.

(For Stock and Share List, see p. 893.)

LAST week was an eventful one on the Stock Exchange; and the ups and downs were sharp and severe. It opened in a state of miserable uncertainty—no one dared to make a move; and the day closed without a change in the Bank rate. On Tuesday, things were, if anything, worse; and Consols touched the extraordinary figure of 101¾. But the Bank rate was put up to 4½ per cent.; and this brought some relief. Subsequently was realized the truth of what we said last week as to actual war being better for markets than intolerable apprehension; for a report of fighting having begun brought in considerable orders to buy—so strong, indeed, that the "bears" had to follow suit. On Thursday, came another rise in the Bank rate to 5 per cent.; and thenceforward to the end of the week a quiet but perceptible recovery proceeded, though still sensitive to a breath of alarm, and Consols closed about the same as they had opened—103½. The Money Market, after a tempestuous week, closed quiet, and much easier. Business in the Gas Market was not abundant; the agitation of the period not extending so far as to make holders press their stocks on the market. But naturally prices could not remain unaffected; and where any changes of quotation have occurred, they are in the downward direction. In Gaslight issues, the ordinary was moderately dealt in every day at figures which kept very steady, although the closing mark was no better than 103½. The secured issues, however, were more freely offered; and all three had to put up with a slight loss—the preference having the worst of it. South Metropolitan showed weakness at an early stage, and began to lose ground; and this increased to the close, when the last mark was only 137½, and the quotation had dropped three points. Commercials were very quiet and steady. The general meeting on Thursday was rendered interesting by the discussion on the policy to be pursued in regard to future capital; and the body of shareholders present received, with evident tokens of approval, the Chairman's exposition of the enlightened policy which the Board will recommend to them when the time for action comes. Business in the Suburban and Provincial group was of the smallest proportion, and devoid of incident. There was rather more doing among the Continental Companies, and prices ruled easy; both Imperial and European losing ground. Among the rest, some of the South American undertakings were flatter; but the Melbourne bonds were higher *ex div.* In the Water Companies, the feature was a general set-back of nearly all the debenture issues, prompted no doubt by the condition of the Money Market.

The daily operations were: On Monday, the Gas Market opened unchanged, and remained so to the close. In Water, Kent fell 1. Tuesday was a quiet day in Gas; and prices continued without change. In Water, debenture stocks were lowered from 1½ to 3 per cent., as detailed in the list. On Wednesday, Gas business was about at its quietest. Gaslight preference fell 1. In Water, Lambeth rose 2. On Thursday, prices in Gas began to give way. South Metropolitan and Imperial dropped 2 each, Gaslight debenture 1, ditto maximum ½, both Europeans ½, and River Plate ¼. Friday was less agitated; only San Paulo receding ½. Saturday was quiet generally; but South Metropolitan was flat, and fell 1.

ELECTRIC LIGHTING MEMORANDA.

The Case of Shoreditch—A Trenchant Criticism—The Need for an Audit—High Pressure Supplies.

LAST week we made passing reference in this column to the electric lighting affairs of Shoreditch, as an example of the barefaced way in which this kind of municipal "enterprise" is being puffed by the newspaper Press. That hardened upholder of all Progressive fads, the "Daily Chronicle," in a brief article entitled "Light from Dust," reported recently that the available surplus of the Vestry electric lighting undertaking up to the close of the last municipal year amounted to £6463. The dust destructor, it was also reported, destroyed 23,000 tons of refuse during the year. "A startling fact is that 750,000 units of electricity were generated from the heat of the parish refuse alone; and the utilization of waste steam from the engines for heating the public baths has saved the ratepayers the sum of £1800." It is interesting to note that the working of this same undertaking, for the same period, has been criticized by the "Engineer" in its issue for the 29th ult. If we had ventured upon such an exercise in criticism, whatever judgment we might have arrived at would, of course, have been suspect. There can be no ground for imputing prejudice to the "Engineer" as regards a matter of this kind. At any rate, it is not gas engineers' jealousy that drove our independent contemporary to say of the Shoreditch enterprise that "the sanguine anticipations of two years ago have not been fufilled by experience." This deliberate judgment appeared four days after the "Daily Chronicle's" declaration that "even the most enthusiastic supporters of the scheme did not dare to hope for the great success which has now been achieved." Which opinion is to be depended upon?

It is remarked in the "Engineer," that originally the Shoreditch scheme was a triple combination of dust destruction, thermal storage, and electricity generation. The parish dust was to do all the electric lighting. It was not long before this effect had to be disclaimed. Next, the thermal storage part of the scheme failed to realize itself; so that the affair has come down to the two elements of electricity supply, with auxiliary steam-generation from dust destructors. The accounts presented to the Vestry show a gross profit on last year's working of £7478. Deducting interest on, and part repayment of, loans, there is a paper surplus of £5682. Thus our contemporary: "This amount includes an item of £405 for the supply of current for lighting and power purposes to the refuse destructor; but it is somewhat strange to find that while taking credit for the £405, the electric lighting department is not debited with a single penny for the steam obtained from the destructor by the incineration of no less than 23,728 tons of refuse. If a charge of this kind had been made, as it fairly should have been done, the surplus of £5682 would have been not inconsiderably reduced by the value of the steam so supplied. It would also have been further diminished had provision been made for depreciation of machinery and plant, since the expenditure of money on repairs and maintenance, as in the present instance, cannot be regarded as equivalent to allowing a margin for depreciation. It is to be noted, too, that notwithstanding the destruction of 23,728 tons of refuse, the coal bill, which in the first year only reached £278, has now advanced to the formidable sum of £1375 in the past financial year. As far as the refuse destructor is concerned, the accounts credit this department with £2372 for disposing of the 23,728 tons of refuse at 2s. per ton, which sum is charged to the dusting and scavenging department. But even with a fairly large credit of this character, the net revenue account of the refuse destructor shows an expenditure of £3616 in excess of the income for the year. It will thus be seen that, by deducting the latter from the surplus of the electric lighting installation, the final financial result of the combined undertaking is as follows: Surplus of electric lighting department, £5682. Deduct deficit on destructor £3616—profit, £2066."

This "profit" requires to be charged with the value of the steam from the dust destructor, and also with a certain amount for depreciation. "If these charges are duly allocated, it will be found that the actual profit on the combined undertaking for the past year is exceedingly small." This, it must be repeated, is the statement of the "Engineer," not our own. There was no reply to the criticism in the last issue of that publication; so we conclude that the Vestry Accountant's Department is content to let judgment go by default. Broadly speaking, it comes to this—that none of these local authorities' claims to electric lighting "profit" is worth a moment's serious consideration, unless the accounts have been properly audited. This is a very nasty thing to say of a branch of the great business of local self-government of which the present generation of English citizens are so justly proud, taking it altogether. But it is childish to play at "make believe;" and this is the game that has become too fashionable with our perfervid municipalizers who have committed themselves to the thick-and-thin advocacy of municipal trading. If the Association of Municipal Corporations will take this much-needed reform in hand, even at the cost of postponing the agitation for the repeal of the Borough Funds Act, the organization will go far to justify its existence. It is not much to ask—only that all local authorities desiring to be represented in the Association should pledge themselves to have their accounts properly prepared and audited. As it is, the propensity of trading municipal authorities to cook their balance-sheets is one of the most deplorable incidental effects of the system.

Some grumbling has been heard over the compulsory introduction by electricity supply companies of the high-pressure direct current, involving the use of the 200 volt lamp. When the alteration was first made, in certain provincial towns, we took occasion to point out that the advantage sought inured in the first place to the suppliers rather than to the consumers of current. In the long run, no doubt, anything that helps to save capital tends to cheapen the supply; but this was little consolation to the sufferer from more extravagant and fragile lamps. The consumers' grievance in this regard was recognized by the more public-spirited supply concerns by giving the new lamps, and making good the wires and connections to stand the increased pressure. Now the change can be made with much less inconvenience than at first; and the benefit to the consumer of being able to get by this means the direct current in localities where he would otherwise have to put up with the alternating current far outweighs all other considerations. Only, it seems fair that with high-pressure supplies the undertakers and consumers should come to some fair understanding about lamp breakages. Hitherto dormant provisions of Electric Lighting Orders respecting the inspection of lamps might be made use of. It is time this question was fully looked into.

The Gas Referees' Winter Instructions have just been issued. Beyond the change in the maximum amount of sulphur permissible in 100 cubic feet of coal gas, from 17 to 22 grains, they do not seem to differ from those for the summer. The name of the new Referee—Dr. J. S. Haldane—figures among the signatories to the document, the appearance of which has been improved by a title-page backed by a table of contents.

LESSONS FROM GERMANY AND DENMARK.

(Second Article.)

In reviewing last week the points of technical interest noticed on the Continental trip of the Institution of Gas Engineers, we found it convenient to reserve the large subject of carbonizing practice for separate consideration. Now, in approaching this subject, we experience more than a small degree of hesitancy in offering that criticism without which a mere record of observed facts would possess little instructional value. Still, the importance of carbonizing is so overwhelming in comparison with every other operation of gas manufacture, that every gas-works must be judged, first and foremost, by the retort-house performance. This follows from the fundamental rule that profits are made in the retort-house. Thorough good carbonizing is, therefore, the touchstone of gas engineering and works management. It matters nothing whether the retorts are horizontal or inclined, thick or thin, charged by hand or by machinery, heated by generator or regenerator furnaces, set in blocks or in brickwork —the only thing that counts is the efficiency of the carbonization. "Worth makes the man"—likewise the retort-setting. Of course, experienced carbonizers know that it is not always fair to judge a strange retort-house by what is seen on a particular visit. Any one "draw" may be above or below the average. One wants to know precisely how much may reasonably be expected of the coal used, and then see what is done with it over a long period. This exhaustive information was not available on the recent occasion. The characters of the coals used—except in the case of the English supplies—were not known to the English visitors. To them the statement that the coal being carbonized before their eyes was "one-third Upper Silesian" conveyed no technical meaning. They could only appreciate the appearance and bulk of the worked-off charges, see how the charging was done, and learn from the ever-courteous guides what they could as to the amount and quality of the output.

It is late in the day to record that gaseous firing is universal. Still, this must be recorded. The fire-work in general is of a very high order. The inclined retort system is making great headway on the Continent; and the high-water mark of excellence in carbonizing in this way must be registered for the Gitschinerstrasse works of the Imperial Continental Gas Association, at Berlin. Here, the "slopers," 15 feet long, are set in nines in an old retort-house. The average yield of the retorts is 16,000 cubic feet of gas per day, from North of England coal, with 15 per cent. of Silesian. The latter coal is stated to be of a fatter nature than the former. The average charge is 300 kilogrammes. No trouble is experienced with the ascension-pipes, or from creeping of the charges. The installation looked like sound business and money-making, from end to end. The charges were thoroughly worked off; the heats were all that could be desired; and the settings, after 800 days' constant work, were in capital order. These were the longest "slopers" seen, with the exception of the new settings at Mr. Marshall's Frederiksberg works, which are 16 feet long.

The different retort-houses inspected during the trip bore out the impression that one of the greatest distinctions between English and Continental carbonizing is in the length of the retort. The long, or "through" retort, which has distinguished for so many years all English gas-works of any pretensions to size, has never been acclimatized in Germany. Consequently, scoop-charging and all the other incidentals of double-ended retort working were unknown when the inclined retort system came to challenge the horizontal retort in its short form. This is the important point—the short single-mouthpiece retort, not even set back to back with a fellow, was the carbonizing unit in Germany. Most of the retorts were 3 metres long, or thereabouts. Consequently, a "sloper" even 12 feet long offered greater possibilities of improved carbonizing than had previously existed. Moreover, settings of nines were an obvious saving on the usual settings of "short sixes" adapted to the exigencies of shovel charging. This all means that a standard of carbonizing erected on the basis of short, single-mouthpiece retorts, set in benches of sixes, must be something altogether different from one based on 20-feet double-ended retorts, set in nines or tens. The inclined retort system had an easy victory over the short retort. Its troubles have come when it became a question of improving upon the long retort.

Unquestionably, things can be done with a short retort which are not possible with a long one. At the Charlottenburg works, for instance, the coke is pushed out from a 10-feet double-ended retort by hydraulic power; and the coal is layered in, in turn. This is, obviously, the ideal way of emptying and charging a horizontal retort. Grafton patented a device with this object so long ago as 1838. His charging-waggon pushed out the coke before it; but he tried to do too much at once, and, naturally, failed in all. We believe that one of Mr. West's early attempts to work retorts mechanically harked back to Grafton's idea of pushing out the coke before the charges; but the limitation of the length of retort amenable to this treatment was fatal to the plan. Mr. West had to reckon with the long retort. If he had been a German, or a Frenchman, he might have succeeded better. As it was, the excellent carbonizing results of the English long retort worked with so much smartness by the old scoop gangs; and the economy of fuel shown by the long settings of sevens, nines, and tens, forbade the shortening of the retort to the limit at which the coke could be pushed out. The coke, it is true, is pushed out of the modern coking-plant retorts in masses of several tons; but it is very dense coke, in tall masses. The conditions are altogether different.

Thus the question of relative efficiency of carbonization must be brought back to the datum. It may be asserted, without fear of contradiction, that the level of efficiency attained by the best English practice with the long retort was very high before gaseous firing, mechanical stoking, or "slopers" were heard of. The application of the first of these modern improvements to the long retort has been a long and troublesome task, culminating now in the detached generator (South Metropolitan Company and Glasgow). British gas engineering practice is amply justified in making the long retort its point of departure. Having triumphed over the difficulties of heating the long retort by the gas-furnace, the next step is to apply the resources of mechanical science to its carbonizing work. The problem is to do this without detriment to the efficiency of carbonization. Some competent critics say that, in most experiments of the kind hitherto, the saving of labour and independence of trained stoking has been made the be-all and end-all of the improvement sought. They ask whether this gain, such as it is, has any set-off in a lessened amount or diminished quality of the output. This is, really, the carbonizer's question of the hour.

Obviously, the saving of labour as regards the provisioning of a gas-works with coal and the marketing of the coke, belongs to a different category from carbonizing work. Grab-cranes and elevators, railways and conveyors, are so many mechanical equivalents for men with shovels. It may pay to lay out £1000 in order to save one trimmer. The net result of the machine or hand labour is exactly the same. Is it so, or is it not so, with regard to carbonizing? If it is so, then the prospects of mechanical carbonizers are very clear. On the other hand, there is a crowd of considerations to be appraised and balanced. Assume that mechanical carbonizing, including the inclined retort system, is good for saving a shilling a ton on the stage of the retort-house. Is this the last word for the change—or will there be a set-off of any kind to add to it? In brief, is mechanical carbonization merely an economy and a method of insurance against labour troubles, or is it a gain all along the line?

Judged by one rule—the test of positive and growing popularity —mechanical (including gravity) carbonizing is a success. It is being taken to all over the Continent, as well as in the United Kingdom; and there is no instance of reaction where it has been adopted. This is a very weighty argument, to which the contemporary witnesses of innovations in all the concerns of civilized life have always bowed, albeit against their own prejudices. History is full of examples of changes made against the expert judgment of the wise and prudent. How long ago was it that gas engineers of weight and standing pronounced against stage retort-houses and telescopic gasholders? What can be seen in Berlin, in Copenhagen, and in Hamburg—since we are dealing with these examples—goes to show that, whatever its excellences, hand carbonizing is fast growing obsolete. Shortcomings of carbonizing results, if such there be, will have to be made good, or allowed for. The old-fashioned stoker, whether shovelman or scoop-driver, will be extinct. Work managers who have adopted mechanical carbonizing do not go back to hand work.

It has been said that a serious obstacle to the universal adoption of inclined retorts is the unsuitability of some gas coals to this method of carbonizing, by reason of their tendency to "creep" or to play other objectionable tricks in the retorts, and afterwards. It is true that a good deal of "humouring" is required to get the system to answer satisfactorily under various conditions. A judicious blending of the produce of different pits is found advantageous in some places. At Frederiksberg, where an originally friable English coal only reaches the retorts after much knocking about, it is liberally watered, to prevent the dust flying up and stopping the ascension-pipes! Most of the English engineers who saw the magnificent engineering of the Charlottenburg Works, would like to see this station again in a year's time. On the whole, if asked whether what they saw in actual working, as regards gas making, was better than that to be seen at home, the gas engineering pilgrims of last month would probably content themselves with a shake of the head, and eloquent silence. Still, it was all very well worth seeing; and he must indeed have been a dull dog who did not realize that his week with the German and Danish gas men was a "liberal education," which he would not have missed for much more than the journey cost in time, money, and pains.

THE DUTIES AND RESPONSIBILITIES OF AUDITORS.

Our contemporary, "The Accountant" (the principal organ of the profession of accountants and auditors), has paid us the compliment of reproducing in their issue of the 30th ult., and of commenting at some length upon, the articles in which, some while back, the "Journal" raised the question of the efficiency of public company auditing, with special reference to the examination of the accounts of gas companies. For a twofold reason, we welcome this notice of our criticisms of the methods of auditing that are, not infrequently, adopted, and of our suggestions as to how these methods might be improved. First, because, in the nature of things, our contemporary speaks to a

far larger audience of professional auditors than we can possibly reach; and we are, therefore, through them, enabled to urge upon the faculty of auditing our proposals for reform—proposals which, whatever value be set upon them, aim at all events at raising the status of the auditor as well as at increasing the security of the shareholder. The second cause of satisfaction is that "The Accountant," in their comments on our arguments, declare that the system we outlined in the original articles as, in our opinion, calculated to provide a really efficient audit in the case of any considerable company, "is one which cannot be regarded as unreasonable, and is, moreover, one which would, in the ordinary course of events, be adopted by the best firms of accountants in their audits." That, coming from the journalistic mouthpiece of the profession, is a valuable endorsement; and our satisfaction thereat is not in any way diminished by the fact that it is preceded by the contention that, in regard to our criticisms of auditors' methods, the point which we desire to make loses much of its significance because we assume that, in the case of large undertakings, the audit ordinarily performed is insufficient; whereas "The Accountant," on their part, "are certainly prepared to contend that the contrary is the fact when first-class firms of accountants are employed."

We are quite prepared to believe, on the authority of "The Accountant," that an efficient system of audit is adopted by "first-class firms of accountants;" but the questions arise, How many public companies are audited by such firms? and—a most important point—How are the public to know which are the "first-class firms"? The fact that the auditors of a company are Chartered Accountants is, we submit, no sufficient guarantee. For support of that contention we need but refer to the revelations in the inquiry into the affairs of the Liberator Society; to the examination by Mr. Justice Vaughan Williams of the Auditors—both Chartered Accountants—of the New Zealand Loan and Mercantile Agency Company ("do you think," said His Lordship, "that auditors are of any use at all?"); and to the more recent evidence of the Auditor of the Millwall Dock Company—also a Chartered Accountant. These instances alone are enough to warrant our assertion; but if further justification be required it can be furnished. At the annual meeting of the Institute of Chartered Accountants, held May 2, 1894, the Chairman, Mr. Edwin Waterhouse, said that, "as the result of the troubles of *many* companies, doubt had been thrown, *and in some cases with justification*, upon the efficiency and use of audits;" while another speaker at the same meeting, referred to the exposures which had recently occurred in connection with the way in which some of the members of the Institute had conducted audits of public companies. He declared that "the effect had been to put back by ten years the position of the Institute in public esteem." The governing bodies of the profession have yet to satisfy the public that only "first-class" accountants are retained within their ranks, and allowed to practice as Chartered Accountants.

But, says our contemporary, "the mere fact that some accountants have occasionally been found performing their work in a manner to which exception might be taken, is no more justification for suggesting that audits in general are inefficiently conducted, than it would be to assume that all solicitors are dishonest because from time to time one is struck off the rolls, and sentenced to penal servitude for the embezzlement of trust-funds." We cannot accept this as an analogy. There is, surely, a wide difference between inferring that inefficient methods are frequently adopted by auditors from the fact that, in case after case, Chartered Accountants have admitted having deemed as sufficient methods "to which exception might be taken," and from the fact that those accountants have been allowed to remain Fellows of the Institute—only to crop up again in other *causes célèbres*, still unpurged of their exceptionable methods—and inferring that the disrating and imprisonment of dishonest solicitors is any reflection upon the profession as a whole. It will hardly, we fancy, be seriously contended that the Institute of Chartered Accountants have a fixed standard of efficiency, and that, upon evidence that one of their members has fallen below that standard in the performance of his duties, they forthwith punish him (much as the Incorporated Law Society punishes a member found transgressing their standard of legal morality) by striking him off their roll and preventing him from again offering his services to the public. In 1894, the Chairman of the Institute said that "the question [of members inefficiently performing their duties] was giving the Council considerable anxiety." Have they successfully removed all cause of anxiety? We venture to say they have not.

We are glad to see our contemporary endorses our expressed opinion as to the necessity of an effective check upon the value assigned to stocks in hand and the amount returned as paid for wages, and of a proper comparison of actual with authorized expenditure. "We are," they say, "surprised to find it suggested that auditors do not, as a rule, compare the prices at which stocks are valued with market prices, or the prices paid for goods bought under contract with the contracts themselves; while the suggestion that the wages of a large manufacturing undertaking are not efficiently vouched is even more surprising. We are not prepared to say that our contemporary [the "JOURNAL"] may not know of cases in which these important matters have been neglected; but we are prepared to affirm, without any fear of contradiction, that it is universally admitted that they are essential parts of an effective audit, and therefore where these checks have not been performed, the audit must be acknowledged to be insufficient." We are afraid that what is "universally admitted" to be right, in many other matters besides auditing, is not always universally practised. We can certainly vouch for it that, in many gas companies, the auditors' check upon the quantities and value of stocks in hand is worthless, and that, in the case of both gas and water companies the wages audit is little better; and we commend to the attention of the auditors of such companies the declaration of the organ of professional auditors that their audit is thereby rendered inefficient. In so far as the wages audit of other public companies is concerned, we will only quote and endorse the opinion advanced by a correspondent to "The Accountant" in a letter upon this point. He expresses the belief that were they "to put the question to the proper officials of any large undertaking as to how often (or whether at all) the wages books were asked for during the course of a general audit, for the purpose of a thorough examination, they would find that their statement"—that where these checks have not been performed, the audit must be acknowledged to be insufficient—"constituted a heavy indictment against a good many practising accountants."

With regard to the question of the valuation of stocks, the surprise now expressed by our contemporary at the suggestion that many auditors neglect to compare valuation prices with market rates, appears to us somewhat inconsistent with their previous comments upon another article that appeared in the "JOURNAL" on the subject of auditors. In the course of those comments, "The Accountant" remarked that, "upon matters in respect of which the auditor cannot claim to pose as an expert (as, for example, in the valuation of most assets), we may point out that the auditor is necessarily obliged, to a large extent, to rely upon certificates of value submitted to him; and if the shareholders do not choose to go to the expense of having these certificates prepared by independent experts, the fault and the risk (if any) lie with them, and not with the auditor." It will be observed that we are told that the auditor has to rely upon certificates of "value"—not merely of quantity. But that is the very suggestion which is now said to be so "surprising." As to the argument that we have quoted, we would ask: When an auditor, relying upon the certificates submitted to him, signs a balance-sheet as "Examined, and found correct," without stating that he has no personal knowledge of the correctness or existence of one of the principal assets, can the shareholders be said to be taking the risk or the auditor to be not at fault? That is what many auditors do.

GAS ACTS FOR 1899.

(*Continued from p.* 816.)

THE Brigg Urban District Gas Act empowers the Council to purchase the undertaking of a local Gas Company, limited, with an actual share capital of £10,000. The term "undertaking" is defined to include all the Company's property except cash balances other than consumers' deposits, reserve fund, stock-in-trade, and stores, besides rents due to and the books of the Company. The price to be paid for the undertaking is to be determined by arbitration under the Lands Clauses Acts, with due allowance for excess capacity of works. The Council are to pay to the Company £200 towards the cost of promoting their Provisional Order, with all the costs of the transfer and the winding up. The Company's officers are to be compensated. The maximum price of 15-candle gas is 4s. per 1000 cubic feet within the district of the Council and 5s. outside. Prepayment for supplies may be required in certain cases. The right of inspecting consumers' new fittings is conceded, with appeal to a Court of Summary Jurisdiction, and notice to the Town Clerk. Other Local Authorities may acquire the portions of the undertaking in their districts. The sum of £10,000 is to be borrowed for gas-works extensions. Surplus gas profits are to go to the district fund.

The Coalville Urban District Gas Act provides for the transfer of the undertaking of the Whitwick and Coalville Gas Company to the Urban District Council. The introduction of the Act was contemplated in an incorporating Act obtained by the Company last year. Notice of the intention to purchase was to be given within one month of the passing of the Act. If the parties go to arbitration, in addition to the ascertained value of the property, the Council are to pay the cost of obtaining the Act of 1898, the expenses of winding up, and compensation to the Company's officers and servants; but the arbitrator is not to have regard to the fact of the Company being incorporated by Act of Parliament. All movable stock-in-trade, gas, coal, and other stores are to be paid for at a valuation. If the amount of the purchase-money remains unpaid at the date of transfer, it is to bear interest at the rate of 5 per cent. The maximum price of 15-candle gas is to be 4s. 8d. per 1000 cubic feet. Consumers' discounts up to 20 per cent. may be allowed. Other Local Authorities may purchase their portions of the undertaking. Surplus gas profits are to go to the district fund. The cost of obtaining the consent of owners and ratepayers is made part of the costs of the Act.

The Gainsborough Urban District Council (Gas) Act authorizes the transfer of the undertaking of the Gainsborough Gas Company, incorporated in 1856, to the District Council. The

Company obtained another Act last year, which provided for the promotion of this one. The Council are also to pay the costs of winding up and of compensation to the employees of the Company, but not the cost of the Act of 1898. The maximum price of 15-candle gas is 4s. per 1000 cubic feet. Power of inspection of consumers' fittings is given, without provision for appeal. The sum of £10,000 is to be borrowed for gas-works extensions.

The Leigh-on-Sea Urban District Council Act authorizes the Council to acquire the undertaking of the local Gas Company at a price to be determined by Mr. Corbet Woodall and Mr. E. H. Stevenson, and thereafter to carry on the business at a maximum price for gas of 5s. per 1000 cubic feet. Besides the sum required for the purchase of the works, £15,000 is to be borrowed for general gas purposes. Surplus gas profits are to go to the district fund.

The Loughborough Corporation Act has a part relating to gas supply. The Corporation are empowered to purchase the undertaking of the Company, at a price to be ascertained (if necessary) by arbitration under the Lands Clauses Act. In this event, the arbitrators are to allow 10 per cent. as compensation for compulsory purchase. In addition, the Corporation are to pay the Company £500 towards the cost of promoting their last Bill in Parliament, all the expenses of arbitration and winding up, and to compensate the Company's officers and servants. Power is given to inspect new consumers' fittings, subject to appeal to a Court of Summary Jurisdiction. Fifteen-candle gas is to be supplied at the maximum price of 3s. 6d. per 1000 cubic feet within the borough, and 4s. beyond. Prepayment for supplies may be required in certain cases. Outlying Local Authorities may purchase their portions of the undertaking. In the clause directing the application of gas revenue, option is given for the establishment of a renewal fund for gas plant not exceeding £10,000. The sum of £40,000 is to be borrowed for gas-works extensions, and £10,000 for working capital. The former loan is repayable in forty years; the latter in twenty years. Consumers' discounts are allowable.

The Scunthorpe Urban District Gas and Water Act schedules and confirms an agreement for the purchase of the gas undertaking by which hitherto the Frodingham Iron and Steel Company have supplied the district. The Council are to pay the Company £500 in respect of the agreement. The sum of £25,000 is to be borrowed for the construction of gas-works; only distributing plant being taken over from the Company.

The Skipton Urban District Gas Act empowers the Council to acquire the undertaking of the Skipton Gas Company, incorporated in 1863. In ascertaining the value of the property, 10 per cent. is to be allowed for compulsory purchase; and regard is also to be had to any capital properly expended otherwise than out of revenue beyond the authorized capital powers of the Company. The taxed costs and expenses of winding up are payable by the Council. Nothing is said about the compensation of officers and servants of the Company. The maximum price of 16-candle gas is 3s. 6d. per 1000 cubic feet. Power of inspecting new consumers' fittings is given, with appeal to a Court of Summary Jurisdiction. The sum of £30,000 is to be borrowed for gas-works extensions, and £5000 for working capital. The former loan is repayable in forty-five years; the latter in thirty years. The gas-works reserve fund may amount to one-fifth of the aggregate capital expenditure for the time being.

The Arbroath Corporation Gas Act authorizes the Corporation to borrow additional gas capital to the amount of £15,000. This fresh loan is to be redeemed by a 1½ per cent. sinking fund, which, with 3 per cent. compound interest, is to pay it off within forty years. The Corporation are empowered to form a contingency and depreciation fund, by setting aside not less than 2 per cent. of the gross annual gas revenue. Twenty-candle gas is to be supplied. Annual estimates of revenue and working expenses of the gas undertaking are to be framed by the Treasurer to the Corporation; and the Corporation are to fix the price of gas accordingly, so as to balance the account. Any discrepancies are to be equalized by altering the price of gas the following year, or by recourse to the depreciation fund.

The Dundee Gas, Street Improvements, and Tramways Act contains a part relating to gas. Additional gas lands are authorized; and fresh gas capital to the amount of £50,000 is to be borrowed. The arrangement for redemption is the same as in the preceding Act. A special clause prescribes the application of the gas revenue, which is made chargeable, in the discretion of the Commissioners, for increasing and extending the mains and works.

The Glasgow Corporation (Gas and Water) Act sanctions the acquisition by the Corporation of additional gas lands, extending to 121 acres or thereabouts, in the parish of Glasgow, and 9 acres in the parish of New Kilpatrick, in the county of Dumbarton. Certain roads and railways for the gas-works traffic are also sanctioned. The Dalmarnock Gas-Works may be abandoned. The period of error in defective consumers' meters is limited to the beginning of the period for which the last account for gas consumed was rendered. The right of inspection of new consumers' fittings is given, without mention of appeal against the decision of the Corporation officer. Tenants are liable for sub-tenants' gas accounts up to two months. Prepayment for gas supplies may be required in certain cases.

The Perth Water, Police, and Gas Act confers additional borrowing powers on the Burgh Commissioners in respect of the gas undertaking, by enacting that section 67 of the Act of 1897 shall be read as if the sum of £75,000 had been therein inserted, nstead of £50,000. The Commissioners may borrow on cash iaccount.

This concludes the special gas legislation of the year, though some Corporation gas undertakings are indirectly affected by certain general provisions of Acts obtained by the Local Authorities for various purposes.

WATER ACTS FOR 1899.

The following Acts of Parliament, passed last session, relate either wholly or in part to water supply.

The Fishguard Water and Gas Act incorporates a Company with a total capital of £16,000, and one-fourth borrowing powers, for the purpose, in part, of supplying water to the parishes of Fishguard, Manorowen, and Llanwnda, in Pembrokeshire. The supply is to be made effective within five years, or the statutory powers are to lapse. The source of supply is a reservoir in the parish of Llanllawer, to impound the waters of the River Gwaen, subject to the liability to compensate a millowner. The works are to be completed within five years. The rates for domestic supplies are to range from 10 to 6 per cent., with 9 per cent. for inns. For meter supplies the maximum charge is 2s. per 1000 gallons. A clause is inserted for the protection of the Fishguard and Rosslare Railways and Harbours Company.

The Lowestoft Water and Gas Act sanctions the construction of additional water-works for the taking of water from the stream known as Hopton Run, and the acquisition of additional water lands. The new works are to be completed within fifteen years. New water capital is authorized to the amount of £80,000, with one-fourth borrowing powers.

The Menstone Water-Works Act incorporates a limited Company formed in 1874. The share capital of the Company fully paid up amounted to £2860, and £2000 borrowed on mortgage. The district of supply is the township of Menstone, in the West Riding of York The capital of the statutory Company is £12,000, whereof £2860 is original consolidated stock, with one-third by borrowing. An additional reservoir is to be constructed in the township of Menstone, to be completed within seven years. Rates for domestic supplies range from 8 to 6 per cent. The maximum price for water sold by measure is 1s. 6d. per 1000 gallons. Clauses are inserted for the protection of the Leeds Corporation and the West Riding County Council. The Wharfedale Rural District Council may introduce next session an unopposed Bill to acquire the undertaking. In this event the Council are to pay the Company's taxed costs of obtaining the Act, and all other expenses of transfer, and to compensate all officers and servants of ten years' service.

The St. David's Water and Gas Act incorporates a Company with an undivided share capital of £16,000 and £4000 loan, to supply water, as well as gas, in the city and neighbourhood named. The supply is to be made effective within five years. The source of the water is a well and pumping-station in the parish of St. David's, subject to compensation of owners and occupiers. Rates for domestic supplies average from 10 to 6 per cent., with 9 per cent. for inns.

The Totland Water-Works Act incorporates a Company formed in 1883. The capital is £10,000, whereof £3140 is original capital, with one-fourth borrowing powers. The works consist of certain service tanks, the source of supply being a spring in the possession of the Company. Particular directions are enacted with regard to mainlaying in the public roads. Rates for domestic supplies range from 7½ to 5¾ per cent. The maximum price for metered supplies is 1s. 6d. per 1000 gallons, and 1s. per 1000 gallons for water supplied to Local Authorities for sanitary purposes. An arrangement is made with the neighbouring Freshwater Company for districting. The Local Authority may purchase the undertaking on stated terms within seven years, and afterward at a price to be ascertained by arbitration.

The Wetherby District Water Act incorporates a Company for the supply of a district in the West Riding, under exceptional conditions as to purchase by some of the numerous Local Authorities, and for the protection of the Tadcaster Rural District Council. The Leeds Corporation are also protected. The capital of the Company is £45,000, with one-fourth loan. The sources of supply are wells in the parishes of Scarcroft and Bardsey. The works are to be completed in five years. The rates for domestic supplies range from 8 to 6 per cent. The maximum price for metered supplies is 1s. 6d. per 1000 gallons.

Sterilization of Water by Ozone.—Herr Weyl recommends ozone for the arrest of bacterial development in water, and he has established an ozone water-works at Charlottenburg. The main feature is a tower down which the water flows through a layer of coarse stones, meeting with the ozone in its passage. The ozonized water runs from the lower part of the tower directly into the pipes; the rate of delivery being from 800 to 900 gallons per hour. It is claimed that the ozone process is more efficient and less costly than sand for the purification of water.

PROCEEDINGS OF THE REGISTRAR OF FRIENDLY SOCIETIES UNDER THE WORKMEN'S COMPENSATION ACT.

THE report of the Chief Registrar of Friendly Societies for the year 1898, recently published, contains the first account of his proceedings under the Workmen's Compensation Act. The duties devolved upon the Registrar by the Act are, it is hardly necessary to repeat, to examine all schemes for substituting, by mutual agreement between masters and men, other benefits for those provided by the Act, and to certify or reject such schemes according to their securing or failing to secure to the workmen concerned benefits equal to or greater than those to which they would be entitled under the schedules of the Act. The Act came into force on July 1, 1898; but the Registrar announced his willingness to receive and consider applications for certificates on and after the preceding 1st of January, in order that the necessary preliminaries might be gone through in time to issue the certificates before the Act became operative.

The procedure adopted by the Registrar is first to require the employer, and such of the workmen as join in the application, to state, in writing, their views upon the proposed scheme; then to afford such workmen as do not approve of the scheme an opportunity of expressing their views thereon; and further, if possible, to induce the promoters to obtain the opinion of a competent actuary upon the financial soundness of the proposals. Many promoters of the schemes now reported upon, however, did not avail themselves of this suggestion, and either consulted accountants or submitted schemes drawn up without professional assistance. The written statements of the views of workmen have, in several cases, been followed by requests for interviews, which in general have been complied with. A common misapprehension has been that the Registrar should be guided by the opinion of the majority of the workmen; and, in consequence, the question whether a ballot of the workmen has been fairly taken, or whether the result of it expresses their real opinions, has been much discussed. The Registrar has been frequently pressed to take a ballot of the workmen, under the control of his office; but, as he points out, such an expedient would really be of no avail. The Act requires him to take steps to ascertain the "views" of the workmen. A ballot—which could only produce an answer "Yes" or "No" to a previously drawn-up question—would, obviously, give no exposition of their "views." Moreover, as the Act expressly prescribes that no scheme shall "contain an obligation upon the workmen to join it as a condition of their hiring," the question how many workmen would be willing to join it is wholly immaterial. It would be quite competent for the Registrar to certify a scheme for a single workman only, if all the others dissented from it.

The really useful purpose which can be served by "ascertaining the views" of those who dissent from any proposed scheme is that of enabling the applicants so to amend their scheme as to meet any reasonable objections of their opponents. This, the Registrar reports, has been done in numerous cases. Objections raised on behalf of the workmen have been discussed with them, and carefully considered; and, if found to be valid, they have been communicated to the applicants for the certificate. In most cases amendments have been readily made; and Mr. Brabrook is able to state, without hesitation, that the result of the first six months' working of the "contracting-out" section has been to show, on the part of employers who have applied for certificates, a desire to meet their workmen in the most handsome manner, and, on the part of the workmen, an excellent feeling of fairness and goodwill. This is marked by the circumstance that, in some cases where employers and men had unanimously consented to conditions which the Registrar did not think complied with the requirements of the Act, the employers at once adopted modifications suggested to them.

In all, up to Dec. 31 last, some 55 schemes had been granted certificates for limited periods—generally for about five years. The number of workpeople involved, and the industries in which they were engaged, are as follows: Railways, 34,933; factories, 20,612; mines, 35,969; quarries, 436—a total of 91,950. Of these 55 schemes, only one was submitted by a gas undertaking—that one being the scheme adopted by the South Metropolitan Company. A summary of the terms of each of the various schemes is given, from which it appears that, in almost every case, provision is made for the first two weeks of incapacity. It is announced that the Lords of the Treasury have drawn up a mutual scheme which it is proposed to adopt in all the Government workshops.

Reference is made to the fact that the Act provides that it shall be the duty of the employer to answer all such inquiries, and to furnish all such accounts in regard to any certified scheme, as may be required by the Registrar. Forms have, accordingly, been drawn up and have been issued to the employers in respect of the year ended the 30th of June last; and from the returns so furnished it is hoped that statistics of great importance may be collected and recorded.

Mr. CORBET WOODALL has been elected Chairman of the Danish Gas Company, in succession to Mr. W. J. KINGSBURY, who has resigned the position owing to advancing years and a wish to feel more at liberty to be absent from England occasionally during the winter. Mr. Kingsbury, however, will retain his seat at the Board.

ELECTRICAL AND PNEUMATIC ARRANGEMENTS FOR INCANDESCENT GAS LIGHTING.

OUR "Register of Patents" has from time to time borne witness to the fact that busy brains have been at work to bring incandescent gas lighting to a high pitch of refinement, usefulness, and convenience—in fact, in each and all of these respects to cause it to be on a par with the electric light, and still to maintain its indisputable qualification of cheapness compared with its rival. For divers reasons, many of these inventions have not had a greater existence than in their author's experimental models, the patent specification, and a brief reference in the technical Press; but those which have emerged beyond that stage have received, as opportunity offered, due notice in this part of the "JOURNAL" as examples of progress and development in incandescent gas lighting. The accomplishments in self-ignition, in high-power arrangements, and in sundry other directions, have been chronicled; but never, beyond what has appeared in our patent record, do we recollect calling special attention to the application of electrical and pneumatic contrivances for igniting and extinguishing incandescent gas-burners situated at distances or in elevated positions, or for the purpose of adding to the comfort and conveniences of our homes and business establishments. There is at the present time on view in an office at No. 20, High Holborn, an installation illustrating what can be done in this direction; and it opens up in one's mind a long range of possibilities in the employment of electricity in the service of gas lighting. The electrical system shown is the invention of Herr C. Franzen, and the pneumatic system of Herr E. Knapp.

Dealing first with the electrical installation of lighting and extinguishing, it is precisely similar to a system of electrical bells, with the sole exception that the active point of operation in the arrangement is not a bell but a small piece of mechanism, confined in a little case no larger than a lever watch, fixed underneath the incandescent burner, and the actuation of which passes the gas to the burner, or shuts it off, as required. There are the push-button, the covered wires, and the battery exactly as required for electric bells; and all that is needed is the pushing of the button to obtain illumination and another push to extinguish it. But one button and its electrical attachments are not by any means confined to the operation of a single light. The installation we have seen seems to suggest that, by affixing the little box of mechanism under each burner, lights may be added to one electrical installation almost *ad infinitum*—at any rate, we are informed that one circuit may be made to deal with at least fifty lights, indoor or outdoor. In the case of a chandelier, one push of the button can be made to light one burner, a second push two other burners, and a third push will extinguish them all. A number of lights in a group, in a row, or in various situations can also be dealt with by one push-button; and by slight modifications, or by the addition of a second push-button, alternate burners may be lighted or extinguished. In bed-rooms a button may be placed near the door for the purpose of lighting; and another near the bed for extinguishing. We cannot go fully into all that is possible by this system; but what is here stated indicates in a general way what can be accomplished.

The principal means by which these things are made possible are found in the small drum-shaped box which is interposed between the burner and the ordinary gas-fitting. Therein is seen a rotatable slide, the periphery of which is formed with ratchet teeth. It has a series of holes through it; and on turning the slide by a step-by-step ratchet motion, these are alternately brought to a position over the gas-supply passages so as to admit gas to the burner, and to an intermediate position between the gas-passages so that the supply is cut off. The rotary slides may be provided with different numbers of holes, so that of a group of burners some will be ignited by the rotation of the slides, while others will not. Within the casing is also a two-limbed magnet, in front of whose poles is mounted a pivoted armature, which, when the magnet is not excited, is kept away from the latter by means of a spring. To the armature is pivoted a ratchet pawl, which is kept by a spring in engagement with the ratchet teeth. At each closing of an electric circuit including the electro-magnet, and consequent attraction of the armature, the pawl turns the slide a distance equal to one tooth, thereby bringing the holes over the gas-supply channels so that gas can pass to the burner. At the next closing of the circuit, the slide is turned in the same direction, in order to bring the holes into an intermediate position, and so extinguish the flame. With regard to the ignition, provision is made within the case for the passage of a small stream of gas to a constantly burning flash-jet, or the ignition may be effected by the electric current, or by other known means. Such are the principal features of the electrical system, which, of course, are modified according to the work the arrangement is destined to perform.

In some respects Herr Knapp's pneumatic system follows similar lines to that already described. The little box containing the mechanism is precisely similar in its external appearance; and it occupies a like position in its relation to the burner. The ignition and extinction of the gas are also effected by the step-by-step rotation of a perforated disc valve. In this case, however, the pawl, by means of which the slide is rotated, is actuated by a small flexible bag inside the casing, and from which a tube

leads through the casing to any distance outside. Air is forced through the tube by squeezing a ball, or by any other suitable means; and this so expands the bag that it presses on the lever which carries the ratchet, and thus effects the partial rotation of the valve. On the air pressure being allowed to again escape from the bag, this collapses, and the lever and pawl are moved back to their original position by a spring; a second spring keeping the pawl in gear with the ratchet teeth. These brief descriptions show that the two systems are somewhat identical; but of the two we must say that we have a decided preference for the electrical.

It should be clearly understood that this notice is written upon a very brief acquaintance. But it may be said that both systems are novel and interesting; and they display great ingenuity in their design. During the twenty minutes spent in their inspection, the lighting and extinguishing of the lights by the electrical arrangement answered instantly and satisfactorily to the pressing of the buttons. Beyond that, without further experience, we cannot go, but can see no reason why the system should not be as effective in its action as an installation of electric bells. For distant and elevated lights, and in places where there are large numbers of lights, it will, we believe, prove useful; but in ordinary domestic lighting its application will be a little luxury. By this we do not mean that it is very expensive; but it can only be, in the dwelling-house, an additional comfort and convenience. As such, it may be adopted to a considerable extent—especially if experience shows that the lighting can be effected with certainty without the aid of the pilot-light. There are good self-igniters on the market; and it is towards the abolition of the constantly-burning pilot-light that improvements in the ignition of incandescent gas-lights must trend. We are told that the system has been adopted at the railway stations at Schroaebisch Hall and Frankenthal in Germany; that the lighting and extinguishing of 186 lamps at Winterthur in Switzerland are now controlled by it; and that at these and other places the installations have given great satisfaction.

PERSONAL.

The personal estate of the late Mr. ALFRED T. LAYTON, of Croydon, who was one of the Directors of the Crystal Palace District Gas Company, has been valued at £95,189.

Mr. HAROLD E. COPP has been appointed, for a probationary period of six months, assistant to Mr. S. Meunier at the Stockport Gas-Works, in succession to Mr. H. J. Robinson, who has gone to Mossley.

Mr. F. W. POTTER, pupil of Mr. John Eunson at Northampton, and afterwards his assistant, has obtained the appointment of Assistant-Engineer of the Shanghai Gas Company, for which applications were invited in the "JOURNAL" some weeks ago. He will leave England on the 18th inst.

Mr. W. C. BURLEY, Secretary and Manager of the Petersfield Gas Company, having found that the duties of the latter office required more time than he could conveniently give, an arrangement has been made to divide the work; and Mr. J. H. LYON, formerly of Malvern Link, has been appointed Manager—Mr. Burley continuing to hold the position of Secretary.

We are sure that the sympathy of numerous of our readers will go out to Mr. JAMES STELFOX, who has sustained a severe bereavement by the death of his daughter. The Gas Committee of the Belfast Corporation have passed a sincere vote of condolence with him; and at the meeting of the Council last Wednesday, reference was made to the sad circumstance which prevented Mr. Stelfox's presence.

Mr. JOHN MACKAY, formerly Gas Manager at Peterhead, and who now represents Messrs. Alder and Mackay in Bradford, was recently the recipient of a very handsome marriage present, subscribed for by his friends in the district. The gift consisted of a silver tea and coffee service, and a cabinet of table appointments, of special design, in all 340 pieces. The magnificence of the present is a testimony to Mr. Mackay's popularity in the district in which he labours. The presentation took place in Manchester, and was the occasion of a pleasant gathering.

Mr. JAMES A. PARKER, who has retired from the rental department of the Ipswich Gas Company after 49 years' service, has been presented by the officials with a barometer and thermometer as a parting gift, expressive of their goodwill. The presentation was made by Mr. J. T. Jolliffe, the Engineer and Secretary, at a dinner given at his invitation. In some interesting reminiscences of his early association with the Company, Mr. Parker stated that he was the first apprentice under the late Mr. Ebenezer Goddard, and had served under three successive managers.

We regret to record a serious accident last Friday afternoon to Mr. E. LLEWELLYN PRYCE, Superintendent of the Adderley Street Gas-Works of the Birmingham Corporation. Mr. Pryce was engaged in the testing-room, with the door closed, when he was visited by one of the valve inspectors. On opening the door, the inspector was driven back by a powerful odour of gas; and on again looking into the room he found Mr. Pryce lying in an unconscious condition upon the floor. Breathing had not ceased; and he was promptly removed into a purer atmosphere, and attended by the ambulance men of the establishment, who endeavoured to restore consciousness. They were, however, unsuccessful; and Mr. Pryce had to be taken to the General Hospital. Under the treatment of the medical staff, he was eventually brought round; and we were pleased to learn yesterday afternoon, in reply to a telegram, that he was progressing quite satisfactorily, and would probably be able to leave the hospital to-day. Had it not been for the prompt first-aid the employees on the works were fortunately able to render, a fatal result might have ensued.

We are sorry to learn that, in consequence of increasing years and failing health, Mr. J. TINDALL, the Manager of the Walsall Corporation Gas-Works, has found it necessary to ask to be relieved from the responsibility of the active management of the undertaking as from Dec. 31 next. The Corporation have assented to the application, and have evidenced their appreciation of Mr. Tindall's services by retaining him as Consulting Engineer. In this way they will continue to have the advantage of his long experience and intimate knowledge of the affairs of the undertaking.

The duties devolving upon Mr. W. FOSTER, the Manager of the Gas and Electric Lighting Departments of the Nelson Corporation, having become too heavy for him, owing to the loss of his son's services as assistant, as well as to impaired health and advancing years, the Gas Committee have decided to afford him some relief; and, as will be seen by an announcement which appears elsewhere, they purpose appointing a Gas Manager. Mr. Foster has been with the Corporation for about twenty years; and, under the new arrangement, he will be able, with lightened responsibilities, still to render valuable help in connection with the two undertakings with which he has been so long associated.

NOTES.

The Riche Process of Water-Gas Making from Wood.

The production of illuminating gas by the carbonization of wood has long been practised in certain localities. That a kind of water gas can also be made from wood, is not generally known. Yet the process has been perfected by M. Riché, who has succeeded in obtaining from wood a much richer fuel gas than can be made in the ordinary gas-producer using coal or coke, besides rendering a valuable bye-product of charcoal. The fact of there being this residual indicates that the Riché process is one of carbonization, and not of gasification by cupola. The inventor, however, so carbonizes or distils the wood as to cause the liquid residuals to pass through the incandescent carbon, and thus makes a gas having a calorific power of 340 British thermal units per cubic foot. M. Lencauchez has investigated this process, and reports against it. He declares that the Riché gas costs more than it is worth. The retorts require to be exteriorly heated; the steam required to make the water gas is generated in the retorts themselves, which is wasteful; and the charcoal produced is of an inferior quality. M. Lencauchez reports that the cost of producing the Riché gas is against its prospects of extended use. Consequently the process is noticeable rather as a curiosity of gas engineering. It is quite possible, however, that for some localities, where wood refuse is plentiful and coal scarce, the process may be useful.

The Legal Allowance for Wind Pressure in New York.

The City of New York has recently passed a building law which seems to be more precise, and to go into greater particulars, than any similar set of regulations of the kind in existence. Among other rules is one relating to allowance for wind pressure, which probably applies to gasholders, inasmuch as it provides that all structures exposed to wind shall be designed to resist a horizontal wind pressure of 30 lbs. for every square foot of surface thus exposed, from the ground to the top, including the roof, in any direction. In no case must the overturning moment of the wind, taken at this standard pressure, exceed 75 per cent. of the moment of stability of the structure. In all structures exposed to wind, if the resisting moments of the ordinary materials of construction are insufficient to resist the moment of distortion due to wind pressure, taken in any direction on any part of the structure, additional bracing is to be introduced sufficient to make up the difference in the moments. In ordinary buildings under 100 feet in height, provided the height does not exceed four times the average width of the base, the wind pressure may be disregarded. So says the rule; but designers of wide-span roofs will probably continue to allow for wind pressure as heretofore. The most noteworthy feature of these regulations is the lowness of the maximum wind pressure allowed for, which is probably less than that permitted in any other government regulations bearing upon the subject. It further accentuates the complaint put upon record by Sir J. Wolfe Barry—that British requirements in this regard are excessive, and inimical to the economical construction of important works such as the Tower Bridge.

Coal-Dust as an Explosive.

The effect of coal-dust in magnifying the range and effect of gas explosions in mines and their covered passages, is discussed in a "Times" article dealing with the new Mines Regulation

Act. It is there explained that, while the efficient ventilation of coal-mines effectually prevents the accumulation of marsh gas in dangerous quantities, this very provision tends to dry the coal-dust and make it more inflammable. It is pointed out that when an explosive jet of flame of any origin traverses an atmosphere containing a very moderate quantity of dry coal-dust, the dusty atmosphere will explode with great violence, and the explosion will continue on and pass throughout any length of such atmosphere; its violence and force increasing as it progresses. Coal-dust from several seams in different districts is almost as sensitive to explosion as gunpowder itself. Coal-dust is, as a rule, more sensitive to explosion in proportion to its greater freedom from impurities; and a brisk ventilation, by increasing the supply of oxygen, has the effect of making explosions of coal-dust more probable and more severe. On the other hand, something is required (as an initiating gas explosion) to raise the coal-dust in the atmosphere. There does not appear to be the smallest probability that an explosion could be originated in the dustiest coal-store or gangway by a naked light or ordinary flame; but, given the necessary concussion of the atmosphere, there is reason to fear that any deposit of coal-dust would cause a disastrous explosion. In most mine explosions of recent times, the course of the mischief has been along the air-intakes and main haulage ways of the mine—that is, where the dust is thickest and the occurrence of fire-damp rarest. The dust, therefore, and not the gas, is the most dangerous element in these explosions.

Creosote for Preserving Wood.

In discussing the methods in common use for preserving woods from decay, the "Builder" has something to say concerning creosote. It is remarked that there is considerable difference of opinion as to the value of creosoting as a preservative for timber; but this uncertainty is largely due to the different composition of various samples of creosote, and partly to the manner of its application. Only the creosote from coal tar is used on a large scale for treating timber. This creosote, our contemporary observes, differs in composition with the nature of the coal from which it is derived. The London make of creosote, obtained from the gas tar from Newcastle coal, is rich in heavy oils (being highly charged with naphthalene), and is often viscid or even semi-solid at ordinary temperatures. Coals from the Midlands furnish a creosote which is lighter, and has a larger proportion of volatile matter. This is known as Midland, or "country" creosote. Scotch creosote, derived from cannel coals, is still thinner and more volatile; being often lighter than water, while the specific gravity of the heavy London oil is sometimes as high as 1·10. Bone oils and heavy mineral oils, occasionally used in place of coal tar creosote, have no antiseptic value; and the addition of crude tar to creosote oils is injurious. On no account should creosote contain any traces of ammoniacal liquor, which acts as a solvent upon ligno-cellulose, and destroys the woody tissue. The heavy London make of creosote is usually preferred for the antiseptic treatment of timber, because it contains the largest proportion of the basic bodies—such as acridine and naphthalene—which solidify in the pores of the timber. Dr. Tidey's specification for creosote is now generally adopted for this use. It provides (1) that the creosote shall be entirely liquid at 100° Fahr., no deposition taking place until the temperature falls below 95° Fahr.; (2) that not less than 25 per cent. shall remain undistilled at a temperature of 600° Fahr.; (3) that 8 per cent. of tar acids should be present. Boulton's process of creosoting timber is recommended as the best.

Further Study of Protective Paints.

Mr. G. S. Webster, Chief Engineer of the Philadelphia Public Works Department, is among the numerous body of inquirers after the best protective paint for ironwork. One of the severest trials of a protective paint is to use it for an iron bridge over a steam railroad. It is scarcely too much to say that if a paint will stand this usage, it will stand anything. Mr. Webster has had samples of steel sheets of identical composition and size painted with different protective paints (some manufactured specially for the purpose), exposed in timber frames suspended from an overhead bridge at a point 16 feet above the metals of a steam railway. Observations have been made of them periodically, and a complete record kept. Plates exhibiting similar behaviour under test have been grouped and classified. Valuable information has thus been obtained respecting the quality of different preparations. For several years it has been the practice of the department to paint structural metalwork with red lead mixed with pure linseed oil, sometimes with the addition of lamp-black. So far, the results of the special tests have not been sufficiently conclusive to warrant any departure from this practice, though the method of application has been modified, and precautions taken to prevent rusting before the paint is applied. This seems to be the net result of the paint tests for the present, though in order to obtain large-scale comparative results in actual practice, the several spans of a bridge over a main line of railway, with little headroom, are to be painted with different preparations. While upon this subject, it may be remarked that American engineering opinion is by no means unanimous on the point of the expediency of having structural ironwork painted by skilled painters, as compared with unskilled labour. Some engineers pronounce emphatically in favour of inexperienced men to do this kind of painting work. In France and Austria, a wash of portland cement, with or without the addition of sand, is preferred to oil paint for protecting structural metalwork exposed to acid or smoke fumes.

The Lining and Covering of Underground Tanks.

The most economical form that can be given to the permanent covering of underground tanks and reservoirs, is a subject of much engineering interest. Mr. Freeman C. Coffin has recently treated the topic historically and critically before American engineering societies. Until lately, brick arches have chiefly been used for covering underground tanks; but portland cement concrete, reinforced as in the Monier system, or otherwise, has now succeeded to the office, as it only costs about one-half as much as brickwork. As concrete can be placed in any form with little trouble, the engineer is free to select any type of arch that best answers the purpose. Mr. Coffin's survey of recent American examples leads him to pronounce in favour of groined elliptic arches on the score of the small quantity of material required, the clear headroom in each direction, and the ease of ventilation. Dimensions given are: Span 12 feet, rise 2 ft. 6 in., thickness of arch at crown 6 inches. There is no way of determining the actual pressures in this form of arching or vaulting; but there are plenty of examples to show that 6 inches thick at the crown is enough. The side walls of these vaulted tanks should be vertical, or nearly so, in order that the vaulting may have to cover as small an area as possible. It is desirable that the outward thrust of the vaulting on the side walls should be taken by a continuous steel ring. The piers for supporting the inner vaults had better be of brick in cement, as there is no economy in forming concrete piers. Mr. Coffin believes in forming the floors of tanks with 6 inches of good portland cement concrete, finished off with rich cement mortar laid on as soon as the concrete is rammed, and before it has had time to set. The liability to peel off which exists in plastering that has been done after the concrete has set, is thus avoided. For the side walls, Mr. Coffin prescribes two coats of cement plaster. The first is to be of mortar gauged 2 of sand to 1 of cement, laid on as thick as it will stick, to even up the inequalities of the wall. This coat should not be smoothed. On it should be laid neat cement, $\frac{1}{8}$ to $\frac{1}{4}$ inch thick, thoroughly laid on with a trowel and nicely smoothed.

Influence of Bacteria in the Decay of Cement.—This subject was recently dealt with by Herren Stutzer and Hartleb in the "Zeitschrift für angewandte Chemie," and it has since been noticed by the "Analyst." It appears that Stutzer observed some time ago that the cement mortar which had been in use for eight or nine years as lining to a water-reservoir was converted into a brownish mud, containing less lime and more iron oxide, &c., than the original cement. This disintegration he ascribed to the solvent action of the carbon dioxide in the water, which dissolved the lime of the cement in the form of bicarbonate. But extracting further samples of the mud from the same reservoir lately filled with sterilized water, the authors found that it was highly charged with nitrifying organisms—so much so, indeed, that, when introduced into a 0·1 per cent. solution of ammonium sulphate, the ammonia reaction practically disappeared in fourteen days, and nitrite reactions were given powerfully. It would appear possible, therefore, in the case of waters containing any appreciable proportion of oxidizible nitrogenous matter, that this production of nitrous acid by the agency of micro-organisms may play some part in the destruction of cement.

Sewage Treatment by Coke.—At the recent meeting of the British Association, Professor Frank Clowes, the Chemist and Superintending Gas Examiner to the London County Council, read, in the Chemistry Section, some extracts from a report on the "Intermittent Bacterial Treatment of Raw Sewage in Coke-Beds." This process, to which reference has been made on previous occasions in the "Journal," was at first experimentally carried out by the London County Council for the treatment of the effluent from chemically-treated sewage; but it is now applied to raw sewage screened through coarse gratings. Coke of the size of walnuts is used, and beds from 4 to 13 feet deep have been tried. One treatment of sewage on the coke-beds removes all the fæcal matter and 50 per cent. of the dissolved organic matter; while a second treatment takes out a further 20 per cent. of the dissolved organic matter. The mode of procedure is to leave the sewage in contact with the coke for three hours, and then allow the latter to stand empty for seven hours for aëration. The effluent supports the life of fish, and neither it nor the coke becomes foul, although no bacterial improvement is brought about by the treatment—a factor which is advantageous for the final stages of purification. Fresh coke requires five or six weeks to get into working order; in dry weather, when the sewage is less dilute, the working is not so satisfactory. In the course of the remarks to which the communication gave rise, Mr. W. J. Dibdin pointed out that the important feature in connection with it was the successful treatment of the sludge, which in London amounted to 40,000 tons a week, and cost a considerable sum to take out to sea. He remarked that the sewage of Leeds had been dealt with on the coke-beds, although it contained a large proportion of chemical refuse. Mr. Douglas Archibald, however, questioned whether the bacterial treatment of sewage would be as efficient as the chemical treatment in destroying dangerous organisms.

TECHNICAL RECORD.

NORTH OF ENGLAND GAS MANAGERS' ASSOCIATION.

Half-Yearly Meeting at Newcastle.

The Forty-fifth Half-Yearly Meeting of the Association was held at Newcastle last Saturday. The attendance was the largest ever experienced at a meeting of the Association.

VISIT TO THE GAS-WORKS.

The members met at the office of the Newcastle and Gateshead Gas Company, in Grainger Street, shortly after eleven o'clock, and were driven to the Redheugh Gas-Works of the Company, on the Gateshead side of the Tyne. The President of the Association (Mr. W. Doig Gibb, Engineer to the Company) was in charge of the arrangements for showing the visitors over the works, and was assisted by the Works Manager, Mr. T. Hardie. It was explained that the works consisted of two portions—old and new—and that it was the new part which was to be shown. There are two retort-houses in the new portion, built of brick, of elegant architectural design, and substantial. An elevated railway runs along each side of the houses, giving ample storage room for coal below. The house which was visited is 300 feet long and 100 feet wide. In it there are two retort-benches, on end, each containing twelve ovens. There are nine retorts, through, ⊓ shaped, 16 in. by 22 in., and 20 feet long, in each oven. There is a chimney, of handsome design, 120 feet high, at each end of the house. The house is ventilated by three large towers, each 6 feet in diameter, and by smaller smoke boxes, in the roof. The firing is by a regenerative system designed by Mr. Hardie. To each bench there is, on both sides, a coal breaker and elevator, all of which are driven by a separate steam-engine. The charging and drawing are done by West's machines, worked by compressed air. The compressors (Messrs. West and Jenkins's patent) are in a separate building, which runs at right angles to the retort-house, and in which are also the boiler-house, the exhausters, and the station meters. There are two compressing machines. They are driven by steam-engines, which are designed to work according to the pressure in the receiving tank; taking steam automatically as they require it. The maximum pressure is 70 lbs. per square inch. Steam for this section of the works is provided by four Lancashire boilers, fitted with Meldrum's patent furnaces. There are two exhausters completed, one of 175,000 and the other of 150,000 cubic feet capacity; and a third is in course of construction. Two have been fitted up by Messrs. Bryan Donkin and Co., Limited, and one by Messrs. George Waller and Co. One station meter has been completed (of 175,000 cubic feet capacity) by the Gas-Meter Company, Limited; and the visitors had the rare fortune to see a second one in course of construction—the drum being in position, with the ends open. Behind this house are two sections of horizontal condensers, and two series of tower scrubbers (six in each), built by the Whessoe Foundry Company, Limited. To the west of these is the purifier-house, in which there are twelve boxes, each 32-feet square, with four trays, requiring 25 tons of lime. The Contractors were the Whessoe Foundry Company and Messrs. Ashmore, Benson, Pease, & Co., Limited. Further west is the sulphate-house, fitted with plant by Mr. Maurice Schwab. A feature of the process is the extraction of the arsenic from the acid by means of the waste gases from the saturator, which leaves extremely white crystals. There is also a closed sulphur-recovery box, on the Claus system, erected by Messrs. C. & W. Walker, Limited. This is at the extreme western boundary of the site, where a gut runs up from the Tyne, by means of which the sulphate is taken away in barges. The gasholders are to the south. The space is fully taken up, which has led to the laying of a main to the site of the new works at St. Anthony's, four miles lower on the banks of the Tyne, where a large new holder has been erected, and into which gas is to be pumped from Redheugh. For the pumping, two of the largest exhausters ever built, each capable of passing 300,000 cubic feet of gas per hour, have been provided. They are driven by gas-engines of 25-horse power. This section of the works, which is capable of an output of 3 million cubic feet of gas per day, has been completed this year. The design was prepared by the late Mr. V. Wyatt, the Consulting Engineer to the Company; but the details were arranged by Mr. Gibb, the present Engineer. As explained by him in his paper read before the Association last April, the gas is sent across the Tyne to a new governor-house which he has erected in Brunel Street, near to the Elswick works of the Company, and from which it is distributed. In his paper, Mr. Gibb fully described the plant in the house, which consists of a series of governors by Messrs. W. & B. Cowan, Limited, pressure-registers by Messrs. James Milne and Son, Limited, pressure-gauges by Messrs. Alder and Mackay, and the ingenious syphon pump arrangement planned by Mr. Gibb, and constructed by Messrs. R. Laidlaw and Son—all of Edinburgh. On the termination of the tour through the Redheugh works, the company were entertained to light refreshments in the house, close by the gate, which was long occupied by the late station manager. On the return drive they called at the new governor-house, and spent some time in an admiring survey of it. The works were seen in their every-day aspect, no attempt at garnishing having been made.

THE MEETING.

The formal business meeting was held at the office of the Gas Company. Mr. GIBB presided, and intimated that several letters of apology for absence had been received.

NEW MEMBERS.

The following were admitted to the Association:—

Ordinary Members.—Fawcett, A. C., Blyth; Golightly, I. H., West Stanley; Henderson, G., Redheugh; Hutchinson, E., Goole; Lewis, J., Newcastle; Nelson, R., Hexham; Templeton, J., Leeds.

Associate Members.—Atkinson, R. L., Newcastle; Thomas, H. (Messrs. Bryan, Donkin, and Co.), Manchester.

THE WORKMEN'S COMPENSATION ACT.

The HON. SECRETARY (Mr. J. H. Penney, of South Shields) read the following report upon the scheme of insurance under the Workmen's Compensation Act:—

It will be remembered that at the last half-yearly meeting of this Association, held in April, I submitted a report indicating that the Insurance Corporation with whom we are insured had only agreed to make an abatement in the premium of 6d. per cent.—namely, from 9s. 6d. to 9s.—which the Committee did not consider satisfactory. However, as the period approached for renewal of the policies, there were rumours that the rate was coming down; and the Insurance Corporation were again approached with the view to a more substantial reduction. In the meantime a circular was sent out from this Association, to gas companies in the North of England, on the 23rd of June last, asking if a lower rate had been quoted to them. The replies indicated that this was the case—thus confirming the rumour. This information having been brought before the notice of the Insurance Corporation, they ultimately met the Committee by reducing the premium from 9s. 6d. to 5s. per cent. This was communicated to the gas companies in the district by special circular on the 1st of July last; and the result has been that most of the gas companies in the North have renewed their policies at the reduced rate, and, with but few exceptions, have expressed their entire satisfaction with the concession. Gas companies in various parts of the kingdom have also taken advantage of this arrangement by insuring. The Committee trust that the members of the Association are satisfied with what has been done in the matter.

The PRESIDENT said they all took it for granted that the Association were much indebted to Mr. Penney for the very hard work he had undertaken in connection with the subject.

JUBILEE CONGRATULATIONS.

The PRESIDENT said he was sure that no one would grudge a few moments—though their time was short—in combining to congratulate Mr. J. H. Cox in having celebrated the jubilee of honourable and onerous service with the Sunderland Gas Company. He regretted, for a moment, that he could not recall the moment when Mr. Cox first joined the Company. He could not even remember the time when he assisted in forming their Association, which was now so prosperous. But he did know that since he came to the district he had found in Mr. Cox a warm and kind-hearted friend, and one who was always willing to extend the benefit of his large experience to those who were not fortunate enough to be in so happy a position as he himself was. They all rejoiced, of course, that his Directors had seen fit to recognize the merits of so faithful a servant. He thought that they also rejoiced that the shareholders had, for once, done better than the Directors, in appreciating Mr. Cox's merits. He begged to move—"That this Association heartily congratulate Mr. J. H. Cox on his completing fifty years' service with the Sunderland Gas Company, and also the spontaneous recognition of his merits by both Directors and shareholders."

Mr. E. H. MILLARD (Durham) said it afforded him great pleasure to second the motion. He, fortunately, could remember, some considerable time back, when he was in the North, the work which Mr. Cox did in connection with the Association. He had now returned to his first love, as he might term it, coming to the North again; and he regretted that they had not had quite so much of Mr. Cox's presence as they would have liked. There were a good many of the old ones now who seemed to think it was time they gave place to the younger. But the younger liked to see their older brethren present, to keep them right when they went wrong.

Mr. W. FORD (Stockton) said they were in rather a peculiar position; one of their original members having attained fifty years' service under a Company he had served faithfully and well. He would suggest that the resolution should be engrossed, in illuminated style, on vellum, and forwarded to Mr. Cox.

Mr. T. BOWER (West Hartlepool) expressed his great pleasure in seconding the proposal. He said it would be noted by some of their members that Mr. Sellers, of York, had also this year attained his jubilee; and he thought it would be very fitting that they should include his name in the resolution, and send it to him in the same way. Mr. Sellers had, in the past, done very much for the Association.

The PRESIDENT cordially agreed to Mr. Bower's suggestion; and the resolution was adopted.

It was left to the President and Secretary to arrange for the presentation of the illuminated copies.

PROPOSED CHANGE OF RULE.

The PRESIDENT gave notice that at the next meeting he would propose—"That persons not under eighteen years of age, holding responsible positions in gas undertakings, and pupils of gas engineers, having the object or intention of becoming gas engineers and managers, be eligible for election as members; and that the rules of the Association be altered accordingly." He said the elaboration of the reasons for this proposal would fall to take place at their next meeting, in accordance with the rules; and meanwhile members could be studying the subject.

THE PRESIDENT'S ADDRESS.

The PRESIDENT then delivered the following:—

PRESIDENTIAL ADDRESS.

Gentlemen,—My occupation of the presidential chair this morning makes me feel a deep sense of the honour you have conferred upon me. The honour is the greater seeing that the Association is in such a flourishing condition. I trust that during my year of office no microbe of discontent or inanition will find opportunity to make a beginning of the decay that so often proves the beginning of the end.

To those who take pride in the growth of our Association, it must be gratifying to note the continued prosperity of the gas industry generally. This prosperity is at present being maintained against keener competition than in former years; and everything goes to prove that the struggle in the future will be even more severe than it has been in the past. It therefore becomes more than ever necessary that the men who are to occupy responsible positions in gas undertakings should be those who, by reason of their general and special education, are best qualified to carry out economically and skilfully the work which they may be called upon to perform. Where are such men, when required, to be got? Echo answers, "Where?" This country is only now slowly wakening up to the fact that in all directions, and in almost every business, foreigners are beating us—and why? Because in many cases Britain's sons are content to be as their fathers were before them, and soothe themselves with the old commonplace: "What was good enough for our fathers is good enough for us."

Fortunately, all are not so slothfully disposed; and an abundance of schools and colleges for general and technical education now invite the younger generation to acquire that intellectual supremacy which will go far towards completely arming them for the future battle of life. I have already said the country is only slowly wakening up; and I am afraid that I must add that those intending to adopt gas engineering as a profession seem to have been the soundest sleepers of all. Whether this is due to the fact that the gas industry can only be indirectly affected by outside competition, or because, as has been pointed out in the "JOURNAL OF GAS LIGHTING," many companies require such a low standard of qualification in their employees, or because students do not know what particular lines of study to follow out, the result, at all events, is to be deplored. The latter cause is a real one; and I therefore purpose devoting a portion of the short time at my disposal to sketching out what I consider to be suitable training for a youth who aspires to eventually hold a responsible position in a gas undertaking. I do so, however, not believing that my views will meet with general acceptance, but trusting that the free expression of my opinion may lead to criticism and discussion, and by that means hasten the formation of a sound public opinion on this most important subject.

At school, special attention should be paid during the last few years to mathematics. On leaving school, if in good health and of strong physique, what I consider the *sine qua non* of an engineer's training—the serving of a practical apprenticeship in an engineering establishment—should be entered upon; a turn being taken while there in all the shops, and also in the drawing office. On its completion, a year or more can be profitably spent in the erector's yard of a firm who make a speciality of gas plant. While at this work, a chance of getting into a gas-works under a good engineer should be looked for; the best place perhaps being in the drawing office, with permission to go anywhere to learn the whole working routine of gas making. During this and the preceding period, opportunities will very likely occur for having charge of small bodies of men, and bearing a certain responsibility in the proper carrying out of work. From the time of leaving school, technical classes at a good college should be joined; the best subjects for study being mathematics, plane and solid geometry, theoretical and applied mechanics, machine and building construction, theoretical and practical inorganic chemistry (as well as a little agricultural chemistry), steam, light and heat, electricity, and, of course, the principles of gas manufacture, if this last be available. After a year or two in a gas-works, with the practical training received there and elsewhere, and with the theoretical knowledge obtained from classes, an appointment to a responsible position may be confidently looked for. Till this be got, and even afterwards, systematic evening study should not be neglected. From the time of leaving school, this training will occupy from seven to nine years; and for the greater portion of this time little remuneration may be obtained. The finished student has therefore paid a heavy price for his training in hard work and study, and in valuable time expended.

The question naturally arises whether the chances of securing a responsible position, and the salary paid to the holder of it, justifies a youth in selecting gas engineering as his particular business. The question is more easily put than answered. Compared with other branches of engineering, I am inclined to say that it does. Undoubtedly many companies do not pay such salaries as will induce students to thus carefully qualify themselves. But the result to those companies is generally a serious and constant loss through the non-application of scientific skill to their undertakings; though probably many of these companies are content, for it is not likely that a governing body who cannot recognize the value of specific and high-class training will detect the constant leakage of possible profits thus caused in their undertakings. Nothing short of the sudden disappearance of some official with their funds can rouse such men.

Before leaving this question, it may not be out of place to give a word of warning to the finished student. He must not, even in thought, disparage men belonging to the old school, or even the "rule-of-thumb" men. Both are really his equals; for while the student may have a technical training, and be steeped full of theories and deductions, the others have experience. This is quite as important a qualification; for it, too, must be acquired by the student before he can be classed as a good all-round man. Even when that happy consummation is reached, it may be well to recollect that some of the older men possibly took more advantage of their very limited opportunities than, relatively speaking, modern students have done with much greater facilities available for self-improvement.

In these days of specializing, while a competent engineer can be found with some knowledge of chemistry, or a competent chemist with some knowledge of engineering, it is rare indeed to find combined in any one man the qualities of a specialist in both. It is therefore necessary, where the size of the works warrants the expenditure, for a good chemist to be kept to help the engineer. With the aid of the information supplied by the former, the engineer may be enabled to design and work plant so as to get the best results from it. In the experimental gas-works, too, the chemist is of the utmost value. In the hands of the engineer, this plant is one of the most valuable pieces of apparatus which can be laid down in a gas-works. Experiments as required can be accurately and cheaply made with its aid; the information necessary for the skilful carbonization of different coals in bulk can be got; the quality of any coal being delivered over a period of time can be checked; the nominal and the mixing values of any enricher can be determined; the action of purifying materials can be ascertained; and, in short, the secrets of coal carbonization generally can be searched after, found, and applied to the works proper. The most convenient size for such an experimental works is perhaps that which has two settings, each containing one single-ended full-sized retort, with other parts of apparatus in proportion. A useful auxiliary to this is a smaller plant with a gas-fired retort designed to deal with 2·24 lbs. of coal at a time. Smaller gas-works could have the advantage of such a plant by either coming to some arrangement with a company who possessed one, or by uniting with other similar-sized works in the same vicinity in maintaining one common to all. It is to be regretted that some recognized method of sampling coals, and one fixed design of apparatus for testing those samples, cannot be arranged and adhered to. When most printed analyses of coals are studied, it is at present hard to say whether the sample of coal tested, or the apparatus by which the results were got, or one's own stupidity in not being able to get such results, should most be blamed; but it is certainly difficult to reconcile the paper results with those obtained from the coal in bulk. The President of the Institution of Gas Engineers has suggested a way out of the difficulty; and I look to the National Gas Research Laboratory and Works to settle these knotty points.

Our Association has taken such a prominent position in securing for its members and others reasonable terms of insurance against the results of the Workmen's Compensation Act, 1897, that I deem a few words on this subject are necessary. The proposal to combine together was first made by Mr. Thomas Bower; and it says much for this gentleman's perspicacity when it is recollected how closely his then prophetic remarks have now become accomplished facts. Through a long series of negotiations, our excellent Secretary (Mr. J. H. Penney) has, for a second year in succession, carried the arrangements to a satisfactory conclusion; and to him the warmest thanks of the Association are undoubtedly due. To secure a 5s. rate in a substantial Company doing an enormous business, is a feather in the cap of the Association; and even though other and smaller companies may now be quoting similar rates, I claim that those lower quotations are in great measure due to the action of this Association, which was the pioneer in the attack on the high rates first quoted. We are only learning as yet the true meaning of the Act itself; and any lengthened reference to it may be profitably left to a future occasion. It undoubtedly extends the responsibility of employers, and improves the position of workmen. In the days gone past, when man and master worked hand in hand, and wages were low, I should have hailed the present Act as a fit and proper one. There is no doubt a moral duty on the part of every employer to see that none of his workmen suffers more than is unavoidable through injuries received while properly following their employment under him. But in the present state

of things, when workmen have, by combination and other methods, forced up their wages until many of them stand at too high a rate, the case becomes different. At the present time, employers have little need to have an additional burden put upon them. I believe strongly in compulsory insurance against all accidents, and suggest that some such arrangement as the following would be an improvement on the present Act. Accepting the rates of compensation as at present named in it (though these are not all they might be) to make it compulsory—

1.—For the employer to insure all his workmen who earn 20s. or under per week.
2.—For the employer and the class of his workmen who earn from 20s. to 30s. per week to jointly insure.
3.—For the workmen earning above 30s. per week to insure themselves.

And now to pass on to other subjects. Some three years ago, I had to plan out a new gas-works of considerable size; and the development of this work still occupies a very large portion of my time. I have therefore had to give serious attention to the particular system to be adopted in carrying out the different processes of gas making. It may not be without interest if I devote the remainder of my address to briefly touching on some of the main features of these works as designed.

The site is rough ground, with considerable differences of level on it. It is well situated, having a navigable river as its south boundary, a broad new road running into the centre of the city as the north boundary, and being intersected from east to west by a double line of railway. The plan of the works has been laid down with due regard to economical construction and working, and with ample open spaces between the different erections. The works are in sections, each one in itself constituting a complete gas-works. The retort-houses are placed "end-on" to the railway, though I should have preferred them side by side. The shape of the site, however, prevented this.

The comparative claims of inclined retorts and horizontal retorts charged by power machinery have been long and carefully considered by me. The local conditions may be stated as follows: The works are situated in such a position as renders compulsory, or nearly so, the use of freshly-wrought best North Durham gas coal. With the exception of what is supplied from one or at most two pits, all the coal becomes more or less plastic when heat is applied, and swells so much that the coke becomes firmly bound in one piece in the retorts. A part of the coal is delivered as dust, or something nearly approaching it; and, in consequence, during bad weather it often reaches the works in a very wet state.

I have had opportunities of carefully inspecting many of the installations of inclined retorts throughout the country. Many work well. The charges are run in evenly; no "creeping" takes place; and the coke practically runs out itself when the stop-plates are removed. But in such installations it is to be noticed, when the doors are opened, that there is evidence on the surface of the coke that the coal had not swollen much, or become plastic, during carbonization. Other installations do not work well. The charges are run in evenly; but considerable "creeping," or, to be more correct, "flowing" takes place. The top parts of the retorts have, in consequence, no charge in them, and are being uselessly burnt away; while the charges towards the bottom, becoming larger, are often not properly burnt off, and the coke refuses to run when invited to do so. When this happens, there follows work of a very severe nature for the men; and if the benches be only manned for perfect working, considerable delay may take place in the re-charging of the retorts. Where considerable "creeping"—to use the older word—has taken place, it is generally easy to see, from the appearance of the top of the coke, that the mass has been plastic at some time during carbonization.

Attractive, therefore, as the system is, it is one where local conditions must be very carefully taken into account. Though well aware that my views may have to be modified, I am at present of opinion that, while inclined retorts are the best for dealing with hard coal, their working becomes more unsatisfactory the nearer the character of the coal handled approaches that of the gas coal raised in the North Durham district. As a consequence, I feel that I should not now be justified in preferring the inclined system to machine-charged horizontal retorts. But I do not wish to be misunderstood. My advice is to test the coals on which you are dependent; and if sufficient suitable material can be got to prevent at any future time a "ring" of colliery owners being formed against you, and especially if you are not able to keep on sufficient retorts to fully utilize power machinery, then fit up inclined retorts. The system has many advantages and some disadvantages; but, with good engineering, I believe several of the latter may be minimized, if not actually done away with.

The retort-houses will, as I have said, be "end-on" to the railway; and the principal coke-yard will be "end-on" to these as well. The coke may therefore have to be moved some 800 yards—a distance which renders the use of direct lines of conveyors from the retorts to the yard quite unsuitable, even if it were wise to use conveyors for coke at all, which I very much doubt. My original intention, some two years ago, and one which I see no reason to depart from now, was to lay small-gauge rails right through the retort-house vaults on to elevated open centre roadways in the coke-yard, and run service trucks with dropping bottoms over these, either by small locomotives or by wire ropes and stationary engines. The coke would be drawn from the retorts on to iron grids below the upper floor, cooled, and then shot direct into the trucks. Kicking-blocks would be fixed on the railway, so that the coke would be automatically tipped from the service trucks either into railway trucks beneath or on to any part of the coke-yard as might be required. Sunk docks in the coke-yard will be provided, for ease in filling the railway trucks from stock.

It is proposed to run the railway trucks at the proper level into the coal-stores, so that the coal may be dropped direct into position. As the hoppers into which the coal will be emptied in the usual course will be situated at the sides of the stores, as the stored coal will not perhaps be moved once in a year, and as with any system of conveyors hand feeding to some extent would be required, I do not consider it necessary or expedient to provide any conveying machinery for handling the stored coal. In a general way, the trucks will tip their contents direct into the hoppers of the coal-breakers, in connection with which there will also be emergency hoppers standing full of coal. To provide for any small deficiency in the day's delivery, I contemplate having another form of storage in high capacity steel waggons, each holding from 35 to 45 tons. These can be moved and filled and emptied by the service locomotives and their men without the coal being handled by labourers at all. They may thus be called portable coal-stores.

I believe that the best results in condensation will be got by leading the foul mains round the inside of the retort-houses, and then allowing as long lengths as possible to be buried in the ground before reaching the condensers proper, which will probably be made in two sections for each complete block—one water, the other atmospheric—and these again subdivided, so that any desired gas temperature can be readily obtained.

For the washing and scrubbing of the gas, probably the best arrangement is to have tower scrubbers followed by power-driven scrubbers; tar-extractors being interposed between these and the exhausters. The tar-extractors, if the condensing arrangements be efficient, may not have much to do; but the damaging effect of tar on the scrubbing surfaces proper is so great as to render the use of extractors advisable. The tower scrubbers will be filled with wood sieves made up of thin boards 7 to 9 inches deep and about ⅜-inch thick, kept apart by strips of similar thickness; the layers of sieves in the scrubbers being "corkscrewed" up so that six or eight tiers are required to complete a circle. By the use of such boards, a much greater area of scrubbing surface is presented to the gas than by the older methods of filling; and there is little or no chance of the gas forming a "run" through the material.

The purifiers will be carried on iron stagings, so that railway trucks can be run below them and the spent lime shot direct from special doors in the bottom of the purifiers. The roofs of the houses will be supported by iron columns only, so that the purifiers may be amply ventilated. For the comfort of the workmen, and in order to prevent chilling wind playing upon the covers, a series of doors running on outer and inner rails will be fitted in each house between the floor and the roof, to form wind-shields. The lime-floors will be to one side of the purifier-houses, with floors at the level of the top of the purifiers, and will have elevated railways running along one side of them, to allow the lime shell to be deposited from the trucks direct on to the floors.

Taking into account the ultimate length of life in gasholders, the questionable great saving in designing them with lifts above the framing, the storm-swept position they have in this special case to occupy, and the limited knowledge of the ground as derived from borings, I have not felt justified in arranging for any lift (of the first gasholder at least) to project at any time above its framing. At a future meeting, I may have an opportunity of giving you my views more fully on this subject.

Gentlemen, I thank you for your patient attention, and, in conclusion, would point out once more that the deductions I have made, and which I have stated in the latter part of my address, are largely based on local conditions and requirements, and are certainly not applicable over too extended an area. But, at the same time, addressing as I do the North of England Gas Managers' Association, I trust that some part at least of this my maiden address may have been interesting, if not useful.

Mr. S. STEWART (Greenock) said he had very great pleasure in proposing a hearty vote of thanks to the President for his interesting address. It was full of matter which was well worthy of their consideration. When he bore in mind what a busy man their President was, it was astonishing to him that he had had time to produce so excellent an address. He (Mr. Stewart) had the greater pleasure in submitting this motion from the circumstance that he knew the President's father, the Treasurer of the Edinburgh and Leith Gas Commission; and he was glad to see the son of that gentleman making so great a mark in the gas profession.

Mr. A. B. WALKER (Walker) cordially seconded the motion. He said he thought that the President's address was specially interesting to the members, particularly to those who had met Mr. Gibb in a professional capacity, and who knew the sort of man he was.

The PRESIDENT thanked Mr. Stewart and Mr. Walker very much for the kind remarks they had made with regard to his address, which he confessed he had prepared under some

difficulties. He waited and waited for some inspiration; but, the inspiration not coming, he had to tackle the matter as best he could. If there was in his address any point of interest to them, he was perfectly satisfied.

Mr. E. H. MILLARD (Durham) read a paper entitled—

ALL SORTS AND CONDITIONS OF GOVERNORS.

I am afraid the title of this paper, so closely resembling that of a popular novel, and my manner of treating part of it, may savour somewhat of frivolity. But, following a holiday season, and this being partly a holiday occasion, I hope that any whose feelings may be thereby outraged will let me down as gently as possible; for I fear I have nothing very *novel* to offer them beyond the title.

I will start with the governor usually first met with in gas manufacture—viz., the exhauster bye-pass governor. Many people are now using gas-engines for exhausting; and I will just point out a useful adjunct I first used under similar circumstances. The speed of the gas-engine being capable of adjustment within very narrow limits, the extreme variations in the hourly makes of gas in summer and winter are met by exchange of speed pulleys; and it is imperative that a portion of the gas should at all times be bye-passed. Of course, the amount the bye-pass throttle-valve should be open varies very considerably; and that useful north country household implement the "wreckin" first gave me my idea for this adjustment.

I have one brass tube sliding within another, and capable of adjustment by means of a pin slipping through holes in each. If one has the holes every $\frac{3}{4}$ inch, and the other every $\frac{1}{2}$ inch, it allows of a very fine adjustment. I am afraid comparatively few beyond the makers fully realize the extra work thrown upon exhausters by this bye-passing. With a vacuum on one side and a back-pressure on the other, making together possibly some 15 to 18 inches pressure, a 1-inch pipe will pass over 5000 cubic feet per hour—a figure which represents half the summer hourly production of the majority here. Hence the importance of having the amount of opening of the throttle-valve readily under control, more especially with the 2-inch or 3-inch valves usually supplied.

With steam-engines, there are now so many excellent governors acting on the steam throttle-valve, that it would be invidious to mention one by name. To prevent a too hasty action in such governors, and also in station governors, the gas inlet-pipe to the bell is throttled; and I have come across several old governors which have been made to act properly by this means. In one case, the inlet-pipe requiring renewal, the fitter carefully removed the *obstruction*, as he thought. A ready means of adjustment is afforded by screwing the top of the stand-pipe to take an ordinary wrought-iron cap, in the sides of which three or four small holes have been drilled, and which can be partly closed by screwing the cap down on the stand-pipe.

We now come to station governors, the benefits of which we are all of us apt to forget till one has to do without them. Much as I should have liked to trace the evolution of the station governor from its earlier forms to its present state of perfection, the time is all too short. However, I will draw your attention to a very early type of governor, as illustrated in "Peckston," about 1840, especially pointing out the water loading, a subject in which I have long been interested, but which has only come into anything like general use during the last decade. Clegg also gives an illustration of Keeling's method of regulating pressure by water loading, in which a reservoir of water is lifted and lowered by a small winch arrangement fixed to an adjoining wall. The rate of loading is regulated by a valve between the two reservoirs.

All the earlier types of governors were open to the objection that they exposed the bell to the full area of the main, and also that the area of the cone at the base was subjected to the inlet pressure when, with small consumption and a change from a light holder to a heavy one, the valve was jumped, and shut the gas off. The general introduction of telescopic holders aggravated the latter risk; and a disastrous explosion in a London gas-works in 1865 showed the danger of the former.

Inventions to obviate these defects were as thick as blackberries. An entire casing-in of the governor-bell was an idea to correct this danger of explosion; arranging for the inlet gas to operate above the cone, and so rather cause it to open, was a cure for the latter. But unless the area of the bell was sixteen or twenty times that of the valve, the governor was not reliable; and this resulted in governors for large-size mains resembling miniature gasholders, and necessitated the use of excessive weights to give the alterations in pressure needed, besides emphasizing the variation in the flotation required according to whether much or little of the bell was under water.

There is little doubt this delayed the adoption of water loading, especially with non-compensating governors, as the cost of the quantity of water required was by no means a small item, and the time necessary to run the water on and off was too great. Others in the field with improvements on governors in the early seventies were Messrs. Hunt, Warner, and Key, with their equilibrium governors. Mr. Methven, in 1872 (British Association meeting), described a method of water loading. Mr. Laidlaw, at the following meeting, described an exhauster bye-pass and governor in which was introduced for the first time an internal compensating chamber with the same area as the valve. This, however, was not patented.

The Braddock station governor, with the compensating chamber inside the bell, was introduced about 1876; and Messrs. Laidlaw afterwards made a similar station governor. With this type, the area of the compensating chamber is constant; but the area of the parabolic valve exposed to the inlet pressure varies according to its position with respect to the seating, so there is not perfect equilibrium in all positions. About the year 1882, Messrs. W. & B. Cowan introduced their governor with the compensating chamber on the top of the bell, which many of us have cause to be thankful for, as it enabled us to make old-pattern governors efficient at a small cost. They also used the parallel valve about the same time. Other makers more recently in the field are Messrs. Parkinson with their double parabolic valves, and Messrs. Cockey with their open-end cylindrical valve—the object of all these being to neutralize the action of the inlet pressure on the valve.

Introducing to the notice of the members a series of pressure diagrams, the author said: It will be as well, at this point, to note the alterations in the pressures now maintained compared with twenty years ago. Diagram No. 8 is taken from "King's Treatise on Coal Gas" of that time, and was presumably a typical one at the period, as it is evidently well up to date—showing, as it does, water loading. The day pressure was brought down to a figure we should now consider totally inadequate. In none of the diagrams supplied by many kind friends is the day pressure below 11-10ths—the more general being about 15-10ths.

For many years I had been experimenting with a view to making a governor self-loading, and had a certain measure of success; but I was always baulked by the cupping and uncupping of the holders. Many others had been working in the direction of an automatic governor; and Messrs. Cowan introduced their highly ingenious clockwork arrangement. Messrs. Parkinson also manufactured Price's patent pressure-changer; but neither of these satisfied my requirements. The first-named was costly, and only worked to pre-determined times and pressures, which might or might not be in accord with the consumption requirements—not to mention the fact of its being dependant upon complicated mechanism and clockwork. The need of such an instrument, however, was so felt that these objections did not prevent its being adopted in many of the larger works. Price's changer failed for the same reasons, besides requiring very considerable attention, which has led to its manufacture being discontinued. However, in Messrs. J. & J. Braddock's self-loading governor something was found to meet the case; and in our new governor-house, carried out in consultation with my old guide and friend Mr. Ford, it was adopted.

A paper having so recently been given by Mr. Whatmough, of Heywood, at the Manchester District Institution meeting, it will be unnecessary to enter into any description of the governor. Ours was at first fitted with parabolic valves, which worked very well with heavy consumptions, but did not reach my expectations with the lighter summer draughts; and I have therefore had parallel valves substituted, which are a decided improvement, as they are arranged to require considerable movement of the bell with slight increase of the demand.

I may just mention that the clearance alone is nearly sufficient to supply our minimum consumption; the valve movement giving $\frac{1}{16}$ inch opening of the leading slot. The amount of opening of the valve is marked for our varying consumptions, from which you will see that an increase of only 4000 cubic feet per hour causes a movement of the bell of from $\frac{5}{8}$ to $\frac{3}{4}$ inch, according to the pressure given by the different holders.

The principle that heavier consumptions require greater pressures is generally accepted; and we endeavour to meet our individual cases by what at best I must term a "rule-of-thumb" method. The increase of pressure is usually from half-an-hour to an hour in advance of the consumption, while the taking off of pressure is very rarely in accord with the fall in consumption. The diagrams that follow—Nos. 11 to 19—have been supplied by *confrères* from our own and other Associations.

The proposition I submit is that the pressure diagram should follow the consumption diagram with minimum and maximum pressures, determined with due regard to the satisfactory supply of the district; and where can you find any better indicator of this than the movement of the governor-bell itself? In fact, one of my many attempts was for an electric contact from the governor-bell to ring a gong to warn the attendant that the water-loading tap should be opened when the bell began to respond to the increased demand. But if the holder uncupped, the arrangement of the heights of contacts had to be altered. I have indicated the movements of the bell of the governor by attaching a cord to the pen of our pressure-register; the water having been previously emptied, when the float acts as a weight to keep the cord taut. By maintaining a constant inlet pressure to the governor, the movement of the bell indicates changes in rate of consumption.

I was not surprised to find, from the discussion on Mr. Whatmough's paper, that some engineers who had accepted the principle enunciated (as evidenced by their introducing a self-loading apparatus) had not found it act up to their expectations; and judging from the light of my own experience, I should imagine they had not tried to find out whether their actual consumptions called for the pressures their preconceived notions demanded. For instance, if a governor is set to start loading

with any increase of gas consumption from a minimum of 5000 cubic feet per hour, and reach its maximum pressure with a consumption of 20,000 cubic feet per hour, it is impossible for the governor to start to unload until the consumption has again fallen below that figure (20,000 cubic feet per hour), or to return to the original pressure until the consumption has fallen to 5000 cubic feet per hour; and I could not rest satisfied until this point was cleared up.

I can assure you it is a most difficult matter to accurately gauge the consumption by observation of the rise and fall of the holders—even when correcting for temperature—and get your consumption diagram to entirely agree with the indicated bell movement, which must be absolutely accurate. I find that our lightest holder gives the best results at minimum consumptions, as of necessity the travel of the governor-bell is greater than with a heavier holder. Should it be desired to alter the limits within which the governor works, it can be easily done by altering the level of the loading-vessel by means of a screw, and the capacity of the loading-tank on the governor-bell by lifting or lowering the air-vent pipe. Thus a quarterly adjustment can be made to meet the varying requirements of the seasons.

An advantage, calculated to lead to increased consumption, that this method of loading possesses over the ordinary way, is that the first consumers lighting up under the old method, with the pressure in advance of the requirements, check their taps to prevent flaring lights, and as others light up, and reduce the local pressure, do not re-adjust their taps; whereas the reverse takes place with a self-loading governor. Further, who of us has not met with the consumer who has small pipes or defective fittings, whom we have the utmost difficulty in convincing that such is the case, as he contends, with some show of reason: "I have a good supply early on in the evening, and can get plenty when I am ready for bed; therefore *your* pipes must be in fault."

You will notice the safety bye-pass governor, previously referred to, to prevent the accidental extinguishing of all the lights by neglect or otherwise. The inlet of this governor is connected to the outlet-main from the station meter and its outlet to the collecting main which feeds the main governor; and it is so loaded as to come into action should the pressure in the collecting main fall below the pressure of our lightest holder, which would be the case if the attendant accidentally closed all the valves, or if the stand-wells became blocked by water or naphthalene, when you at once have the make, and also the stock of gas in the holder into which you may be working at the time, available for supplying the town.

I see that a failure of supply was recently reported where some such arrangement was in use; but it appears to me that in only two ways would this be possible—viz., either the valves were stuck on their seats (proving neglect to try the governor daily), or at the time of the accident the make was going into the same holder as was supplying the town, and which was allowed to become grounded.

The cost of this arrangement is so small—there being no necessity for a full-sized governor—that I cannot understand any engineer who has the means and convenience for adopting it undertaking the risk of his district being placed in the dark by not doing so. I am inclined to think I have made a mistake in adopting a double-valved governor for this purpose, as the valves being usually on their seats there is about 40 per cent. more circumference subject to any sticking action than would be the case with a single valve giving the same area. But, at the same time, the governor is exceptionally quick in action; and I have purposely closed all the valves—so bringing it into action—to show you how little the pressure diagram is affected.

This safety governor is also available for governing the town supply in case of any temporary stoppage of the large governor for inspection. In too many cases when governors have been ordered, no forethought appears to have been given to the position of the floor-line relative to the connections, with the result that the appearance of many governors has been completely spoilt by their being half buried below the floor-line. This might have been avoided by very slight alterations from the makers' standard dimensions.

May I trespass still further on your patience, to touch upon a particular application of a district governor? The district in question is about three-quarters of a mile from the works, and is a long, straggling district, extending over 2 miles, at an average elevation of 200 feet above the works, with a drop at the farthest end of 50 feet. The main is too small to supply the maximum demand; and consequently we get excessive pressure in the day, and a low one at night. The consumption hardly warranted a larger main being laid, provided with a differential governor. However, I was determined to reduce this excessive day pressure, and accordingly fixed a district governor provided with a bye-pass; the latter being opened by the lamplighter on that district when commencing his rounds, and being closed again on his midnight round. This arrangement worked well for a time, until some incandescent burners with bye-pass lights were fixed. These were jerked out a few times; and consequently the practice had to be discontinued. If anyone has a solution of the difficulty, I shall be glad to hear of it.

I have been accustomed to use the pressure-sheets three times, by having different coloured inks, which is not only a small economy, but means fewer papers to be stored up lumbering the office. With pressure-registers to be obtained at such reasonable prices, I cannot understand any works, however small, being without one or more. I am sure they will repay their cost many times over, as by their means the manager can tell at all times if the men are doing their duty—in attending to the regulation of the pressure and to the running of the exhauster.

At the close of the paper,

The PRESIDENT said they had not much time left; but if anyone had anything to say upon the subject of the paper, he would be glad to hear them.

Mr. FORD said he wished to make a remark instead of a criticism of the paper. It was a communication which they might well discuss for the next hour, very profitably to themselves; but seeing that their time was so limited, he thought they might more satisfactorily discuss the subject after they had studied the paper closely, through the medium of their printed proceedings. It could be taken up at an early stage of their next meeting. He made the suggestion, not at all in antagonism to Mr. Millard, or his paper, but in favour of them.

The PRESIDENT said it seemed to him that Mr. Ford suggested the wiser course. They must either have that day a short and unsatisfactory discussion, or they must leave it over to a future meeting, when they would have more time to properly discuss it. It was really a paper which required digestion at leisure; and he was sure that the postponement of the discussion would result in a very much better one taking place. If this were the feeling of the members, he thought they might adjourn the discussion to their next meeting.

This was agreed to.

Mr. D. TERRACE (Middlesbrough) said he quite concurred in what had been done; but he thought it would very greatly add to the interest of the paper if Mr. Millard, between this time and the spring meeting, would look into the matter of the winter consumption, and tell them something about it. What he had given them all referred to summer or autumn consumption; but the winter consumption would be more important.

Mr. MILLARD said he should be very glad to do that if the members who had supported him by giving him the diagrams he had put before them would further assist. He certainly thought it would tend to the improvement of the discussion if between now and the next meeting members would indicate the movement of their governor-bells and the station inlet pressure. This might help to supply them with information upon some things they were not aware of at present.

Mr. M. DUNN (Goole) proposed a vote of thanks to Mr. Millard, who, he said, was ever ready to offer his services at a time like this. He thought Mr. Millard's readiness in coming forward was very much in evidence. The paper had undoubtedly been a very fine one; and, as Mr. Ford had wisely suggested, it needed going over very much before discussion was opened upon it, if they were to do justice to it. He believed Mr. Millard was anxious that the paper should be thoroughly discussed.

Mr. TERRACE seconded. He would look forward, he said, with interest to the discussion.

Mr. S. STEWART proposed a vote of thanks to the President for the manner in which he had conducted the business of the meeting.

The members and a number of friends were entertained by the Newcastle and Gateshead Gas Company to dinner in the County Hotel. Mr. W. R. Plummer, the Chairman of the Company, presided, and proposed—"The North of England Gas Managers' Association," which was responded to by the President. Mr. C. Dru Drury, of Sunderland, proposed—"The Chairman and Directors of the Newcastle-upon-Tyne and Gateshead Gas Company;" and the Chairman replied. "Kindred Associations" was proposed by Mr. W. Hardie jun., of Tynemouth, and was acknowledged by Mr. R. G. Shadbolt, of Grantham. This brought the proceedings of a very highly successful meeting to a close.

A SAFE METHOD OF TORCH LIGHTING FOR INCANDESCENT STREET LAMPS.

Inventions of an auxiliary character to incandescent gas lighting for street illumination crowd upon us. To the several contrivances which we have already noticed having for their object convenience in ignition or the protection of the mantle, another comes which is neat and simple in design, of unquestionable durability, and unfailing in the performance of its duty. It is the production of Messrs. Alexander Wright and Co., Limited, of Westminster (having been patented by Messrs. Simmance and Abady); and the device will meet the requirements of those engineers who have an antipathy to the constantly burning flash-light, or who have no faith in the many ingenious self-igniters which have of late years found their way on to the market. By Messrs. Wright and Co.'s arrangement, the old lamplighters' torch is brought into use with the same facility and safety for incandescent street lights as in the case of the ordinary open-flame burners and lanterns of the usual pattern; and it follows that the objections which have been raised to pilots and automatic devices are entirely absent. Hitherto the chief drawbacks to torch lighting for incandescent lamps, and which have

prevented its extensive use, have been: First, the liability to destruction to which the mantles were exposed; and, secondly, the risk of back-lighting. To avert dangers of this kind, the flash-jet has been largely adopted, seeing that by it the gas issuing from the burner is instantly lighted, and lighting-back is avoided. The new system (which has been exhibited to us) is practically the old flash-light, with the important differences that the jet is only alight for about a second per day, and that its lighting is effected by the ordinary torch. It is so simple that the wonder is it has not been thought of before. The arrangement can be described in few words: A short tube is fixed in a corner of the lantern close to the rib, and is provided at its upper extremity with a jet at such an angle that, when lighted by the torch, the flame shoots towards the centre of the lantern above the mantle or chimney as the case may be. The gas is supplied to this tube through the ordinary lever lantern cock, which has a second outlet for this purpose. The plug is so drilled that, by turning the lever half on, gas is supplied to the jet, and is lighted by inserting the torch through the lighting-door. Then, by turning the lever cock full on, the gas supply to the mantle is ignited, and simultaneously the jet is extinguished. The risk already referred to, of destruction of mantles by the insertion of the torch, is entirely prevented. A special stop is fixed on the door at such an angle that, when the door is pushed open rapidly by the torch, it remains fixed at a point at which it is absolutely impossible for the torch to approach the mantle. At the same time, however violently the door is thrust open, no vibration is communicated to the stand-pipe. To extinguish the light, the lever cock is simply turned off in the usual manner. Besides the advantages already enumerated, others will readily occur to commend the new arrangement in preference to the old pilot light. For instance, the blackening of the mantles by elongations of the jet through alterations in pressure and increase of quality will be avoided; and the precautions found to be necessary to prevent flash-jets being extinguished by the diminution of pressure or by violent winds, and the consequent trouble to re-light them, are also obviated. The gas, too, consumed by the ordinary flash-light—which, fractional though it may be per lamp per hour, becomes an item that cannot be ignored when spread over a large number of lamps for any lengthened period—is also saved. In adopting the system, the alterations required, being so simple in their details, can be effected in any existing modern lamp at a trifling expense. As already remarked, there is an opening for a device of this kind where pilots and automatic appliances are objectionable.

THE "CEROFIRM" MANTLE.

The "Cerofirm" mantle, which has lately been put on the market by a Berlin firm, is the outcome of researches which were recently described by Herr W. Bruno in three issues of the "Zeitschrift für Beleuchtungswesen." As his communication is of considerable interest in many respects, we append a *résumé* of it.

The ordinary mantles for incandescent gas lighting have two faults—viz., a falling off in the light emitted after a more or less brief time, and the feebleness of the structure of the mantle. The Welsbach mantle is a skeleton of the oxides of thorium and cerium of extreme fragility. The mantle must not offer too great a resistance to the flame; and it is therefore made unusually fine and light, and consequently is extraordinarily fragile. A more nearly solid mantle would absorb too much heat; and it may be said forthwith that the numerous attempts to make "solid" mantles are doomed to be frustrated because such mantles would absorb much heat, and comparatively little heat would be converted into light. The solidity of a mantle may be increased, up to a certain degree, by the use of a very strong solution of the salts employed for impregnation; but the strength gained thereby is quite trifling, and a considerable reduction of lighting power results. The idea of making mantles of fine wires, or of incombustible filaments, at once suggests itself; but, likewise on account of the great absorption of heat, such mantles also fail. A simple means of increasing the hardness and strength of a mantle consists in raising the temperature of the flame by which the mantle is incinerated and hardened during its manufacture. The increased flame temperature for the purpose is secured in large mantle factories by the use of gas under pressure. A pressure of 80 or, at the very highest, 120 inches of water, puts the mantle in danger of being ruptured by the force of the issuing gas. The use of oxygen or water gas, in order to obtain a high temperature for hardening the mantles, would raise the cost of their production considerably. The mantles hardened by a very hot flame do not, however, greatly surpass other mantles in strength; and, moreover, they fall short in lighting power of weaker mantles made of the same materials. The inferiority of the hard mantles in lighting power appears to be due to the fact that at the high temperature the oxides have been more strongly fused. Mantles made from impregnating fluid which partially consists of the sulphates, are also hard; but they do not emit so powerful a light as the weaker mantles made entirely from the nitrates. Thorium sulphate does not exhibit so high a degree of porosity in the crucible as does thorium nitrate. Long exposure to the bunsen flame hardens a mantle in the same way as high temperature hardens it. Some hours' use considerably increases the hardness of a mantle; but, at the same time, the lighting power is diminished. After rather more than 100 hours' use, the hardness generally ceases to increase, and the lighting power no longer decreases rapidly. The lighting power of a mantle appears to be in the inverse ratio to its hardness, as experiments described later will indicate. Hardness may also be imparted to mantles by making certain additions to the thoria and ceria. Experiments were made with solutions of from 4 to 10 of the nitrates of these earths, with the following added thereto by increments of 0·1 per cent.:—

Aluminium.—0·1 per cent. imparts a certain degree of elasticity and toughness to the mantle; and on increasing the proportion, a very refractory mantle is produced. The addition does not affect the light emitted by the mantle; but mantles containing even traces only of aluminium contract just above the top of the burner. The deformation is attended by a great falling off in the light; and mantles containing much aluminium, in half an hour only thus show a decrease of half of the light emitted by them when first used.

Magnesium in amounts of about 1 per cent. makes mantles liable to split, but generally resembles aluminium in its effects. Magnesium appears adapted to replace thorium in mantles; and a magnesium-cerium mantle closely resembles a thorium-cerium mantle. It has, however, not been found possible to avoid the splitting of the magnesium mantle.

Beryllium in amounts of less than 0·5 per cent. has no effect on the mantle. In larger amounts, it causes the mantle to contract and become useless.

Zinc causes a great reduction in the light emitted.

Cadmium resembles magnesium in its effect on mantles.

Calcium causes the mantle to contract in a longitudinal direction; and it reduces the light emitted. The result of its addition is to produce a mantle such as one made from impure yarn.

Potassium and *Sodium* both give the mantle a somewhat conical shape, and make the light emitted permanently of a pale yellow tint. Mantles containing sodium may be recognized by the fact that, when incinerated, they are of a gray colour, and crumble readily.

For the sake of completeness, experiments were made on the addition of two or more of the above substances to the thorium-cerium mantle. No novel results were attained, as usually the properties of one of the added substances dominated those of the other. A perfectly practicable mantle was, however, obtained by adding 1½ per cent. of a mixture of one part of magnesium and two parts of thallium.

Mantles containing selenic acid exhibit peculiar properties. In the cold, they are feebly phosphorescent; when a weak electric current is passed through them, they glow momentarily.

Yttrium is present in very minute traces in the Welsbach fluid. Additions of traces of yttrium to mantles give them a peculiar brilliancy, which makes such mantles readily recognizable among others. Unfortunately the effect is not permanent; and mantles containing as much as 0·5 per cent. of yttrium soon emit only a dull feeble light.

Didymium resembles cerium in its effects; but it reduces the light emitted even more energetically. It is associated with cerium; and in the production of good cerium, the aim is to secure it as nearly as possible free from didymium.

Lanthanum also is one of the substances which give mantles a certain degree of hardness, but reduce the light emitted. It makes the light brownish in tint.

Those substances—such as chromium, cobalt, zirconium, and uranium—which stiffen the mantle, but at the same time make the light emitted of a peculiar colour, may be passed over.

None of the substances named—except aluminium, magnesium, and beryllium—could possibly be used to replace thorium, as they have not the necessary degree of coherence. Beryllium is too costly to be practically available.

Many experiments were made with the compounds of chlorine, of which sodium hypochlorite proved the most suitable addition to mantles. The mantles did not lose their shape; and one showed a tolerably constant light for 500 hours.

Mantles of thoria with platinum, palladium, or iridium do not lose their shape or frit; but the light emitted is red in tint, and they are therefore of no practical utility. Molybdic and tungstic acids do not affect the light or the durability of mantles; but tungstic acid has the unmistakable advantage of rendering the mantles easy of manufacture.

It has long been recognized that silicic acid strengthens mantles. The author found that equally good results were obtained, whether the burnt-off mantle of the usual composition was dipped in an alcoholic solution of an organic compound of silica or in an aqueous solution of an inorganic compound. The light emitted by the mantle was reduced, however, as the hardness was increased. Thus a mantle which gave a light of 80-candle power yielded, after it had been silicated, a light of only 45 to 48 candles. For the best lighting effect, it was essential that the mantle fitted very closely round the top of the burner. Mantles containing overmuch silica are at first soft and of a black colour, and give a dark red light; but after some hours in the flame, they become hard and white.

Lithium added in quantities of about 0·5 per cent. to the thorium-cerium solution, rendered the mantle soft, but capable of emitting a vivid white light, which, however, rapidly decreased in intensity.

After numerous endeavours to effect an improvement of the incandescent mantle by means of additions to the thorium-cerium solutions had been made without good results, the materials of this solution were made the subject of investigation. Usually great stress is laid on the importance of a high degree of purity of the thorium, and defects in the mantles are often ascribed to impurities in the thoria. This appears to be a mistaken view. It can be of little moment, whether more or less—but in any case a quite trifling amount of—cerium is associated with the thorium. The removal of the ceria is the greatest difficulty in the preparation of pure thoria; and the photometer affords the simplest means of testing the degree of purity of thoria. A pure thoria mantle will give a light not exceeding 5 candles in illuminating power. If the quantity of ceria is between 0·9 and 1·25 per cent., no difference can be detected either in the colour or power of the light. Below 0·9 per cent., the illuminating power becomes perceptibly lower; and with about 1·4 per cent., a yellowish tint—which vanishes, however, after 100 hours' use—is observable.

The causes of the falling off in the light emitted by mantles on continued use do not appear to have been clearly made out. The falling off has been ascribed in part to deformation of the mantle, and in part to volatilization of ceria, which, notwithstanding its refractory nature, appears to volatilize to a certain extent. A mantle which has been used for several hundred hours, and emits only a dull whitish light, will be found to contain only about 0·5 per cent. of ceria; and if a new mantle containing this proportion of ceria be manufactured, it will be found, on being properly tested, to afford a light of similar nature and intensity.

Cerium preparations from different sources cause quite different effects; but different thorium preparations, when used with ceria from one source only, have no special effects on the light emitted. Thus the ceria appears to be far more influential than the thoria on the quality of the mantle. Using thoria from a single delivery from one works with ceria from different sources, it was found that mantles in which one of the samples of ceria had been used contracted about the middle; those in which another sample of ceria had been employed gave a yellowish light; and those in which a third sample had been used showed considerable depreciation in illuminating power after only 24 hours' use. Didymium was not present in the ceria in all these cases, and could not therefore have caused the defects of the mantles. These seemed likely to arise from the method in which the ceria was manufactured, and not actually from its degree of purity. This conjecture was proved by subsequent researches to be correct; and at the same time new light was thrown on the assumed volatilization of the ceria. The falling-off of illuminating power on use depends on a peculiar behaviour of the ceria which has the same effect as would its volatilization. The prolonged heating alters the condition of a portion of the ceria, so that that portion behaves as though it were in a state of combination. It loses its catalytic properties, and does not show the usual reactions of ceria. On account of this inactive condition of a portion of the ceria, old mantles frequently, on analysis, have been reported to contain only small quantities of ceria. The inactivity of a portion of the ceria arises from the method in which it is usually produced, whereby only a portion of the product is unaffected. This unaffected portion remains active; but the rest of the ceria passes into a passive state as soon as it has been in the flame for a short time. It does not matter whether it is in the reducing or the oxidizing zone of the flame. Accidentally, it was found that the passive condition is destroyed by a high temperature—such as that of an oxygen blow-pipe—and slow cooling. The activity then remains for (say) 20 or 30 hours, and may be again restored by a fresh tempering. The duration of the period of activity extends with each tempering. Such a process of tempering evidently could not be applied practically to finished mantles. Knowledge of the above facts, however, resulted finally in the discovery of a method by which the regeneration of the ceria could be automatically effected. This faculty of regenerating is secured by systematic regulation of the temperature during manufacture.

Observations, based on daily tests and on determinations of the heating value of the gas, carried on for years, showed that mantles frequently first deteriorated in lighting power and then improved. Thus mantles after 40 to 46 hours' use lost about 6 to 8 candles in power, and after a further like period regained about 3 to 4 candles. Thus, though there was ultimately a falling-off, the fluctuations were remarkable, if only on account of their regularity. The lighting power of the mantles has usually been ascribed to change in the degree of oxidation of the cerium, or to catalytic action. However this may be, it seemed certain that there was a change which took place in long alternating periods, and was accompanied by a corresponding rise and fall in illuminating power. Strong reducing agents had no effect on the light. But oxalic acid produced a remarkable improvement in illuminating power, which, however, was only of momentary duration; and though a further application of oxalic acid again raised the illuminating power, the original intensity was not reached. In this instance, the rise and fall were exhibited in a more pronounced manner.

These researches indicated that it was possible to impart regenerating qualities to the cerium; but it was doubtful for a long time if the regeneration could be so regulated that the periods of depression in the light were followed by periods in which the light increased to a corresponding extent. The alternation of the periods was made to happen every 20 or 30 hours. In the researches made, the barometric and hygrometric conditions were observed; the pressure and consumption of gas were accurately recorded; and calorimetric and purity testings of the gas were made before each photometric reading. The atmospheric pressure was found to have no effect on the light emitted by the mantle; but a very damp atmosphere was found to reduce the light. In the extraction of thoria and ceria from monazite sand, one process is always adopted so far as the preparation of the thoria is concerned; but the ceria is obtained at different factories by methods which are often regarded as secret. Now the differences found in the finished mantles cannot be attributed to the thoria, as one and the same sample of thoria will give most varied results. The variations have frequently been ascribed to differences in the handling of mantles during manufacture. In reality, however, the chief difficulty in the production of mantles of uniform quality lies in the purity and method of production of the ceria. The sensitiveness of the ceria must clearly not be overlooked during the process of mantle manufacture.

Mantles manufactured with ceria produced according to the author's method, show the periodical rise and fall in lighting power due to regeneration of the ceria, which has been already described. One of these mantles was tested by the Imperial Physical-Technical Institute against an ordinary mantle. The report shows that the light given by the latter fell with 200 hours' use, from 96 to 74 candles [probably Hefner-units]; while that from the "Cerofirm" mantle fell only from 84 to 81 candles with the same use under like conditions of pressure (12-10ths), &c. Other tests made by persons holding official appointments confirmed these results; but as the author is not at liberty to publish the names of the observers, it would be of little service to give their figures.

The following table, however, gives some of the results of tests carried out of the "Cerofirm" mantle made as follows: (*a*) by the author; (*b*), (*c*), and (*d*) by Dr. Hugo Krüss, of Hamburg; and (*e*), (*f*), and (*g*) by Herr A. Luber, Municipal Inspector of Lighting at Munich. [Columns (*e*), (*f*), and (*g*) are from the "Journal für Gasbeleuchtung," and do not appear in Herr Bruno's paper]:—

Light Afforded by "Cerofirm" Mantles.

—	(*a*)	(*b*)	(*c*)	(*d*)		(*e*)	(*f*)	(*g*)
Consumption in Cubic Feet per Hour.	3·95	..	..	..	..	3·88	3·88	3·88
Pressure in Tenths of an Inch.	12	..	..	..	..	10	12	14
Number of Hours in Use.	Candles. (Probably Hefner Units.)				Number of Hours in Use.	Hefner Units.		
0·5	78	79·0	86·5	79	0	84	90	93
100	90	88·0	87·5	..	216	66	75	84
280	75	..	..	..	420	67	75	82
300	..	80·0	79·0	..	612	65	71	77
330	90	..	..	..	804	69	73	80
380	84	..	..	..	1004	65	71	75
500	91	85·0	84·0	..	1764	67	71	74
800	76	79·5	81·0	..	2148	62	67	72
1200	..	..	..	74	2412	59	64	70
1400	..	..	..	73				
1500	76	..	..	..				
1600	..	..	..	74				
2000	78	..	..	..				

Note.—1 Hefner unit = 0·877 English standard sperm candle.

It is most advantageous not to have too high an initial lighting value, as otherwise the falling off is considerable, and the succeeding rise does not restore the initial value. Endeavours to restrict the initial power within certain limits have not so far proved completely successful. Mantles made of precisely the same material, and with the same manipulation, differ in their lighting effect. Perhaps the difference may arise from the action of the flame, which burns off the salts to oxides; for the oxides would be formed under slightly different conditions, and consequently would behave differently, according as the burning off took place in one or another zone of the flame.

Glass Gas and Water Mains.—Scared by the havoc alleged to be wrought on iron and lead pipes by electric currents, the engineering editors of some of the daily papers in America have been advocating the use of glass gas and water mains. We learn from the "Engineering Record" that a Salt Lake City editor recently suggested that if such pipes were obtainable at a fair price, there would be many advantages in their use—one being their non-liability to corrode. Our contemporary says these remarks would not be worth notice were it not for the fact that, in a sober editorial in a magazine devoted to engineering, the writer said it did not seem so very visionary to speak of glass pipes as the coming pipes for city use! We venture to disagree with him.

REGISTER OF PATENTS.

Preparing Calcium Carbide for Use in Making Acetylene.—Bond, E. S., of Handsworth. No. 23,346; Nov. 7, 1898.

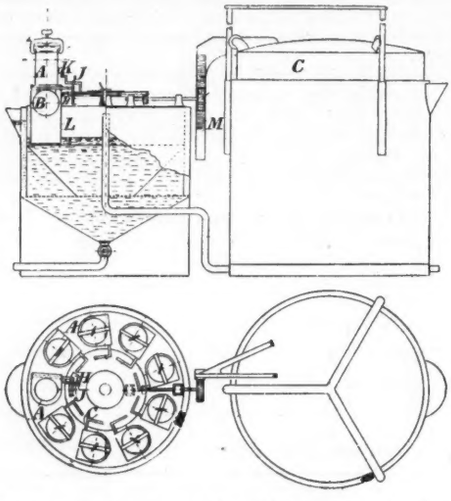
This invention relates to means for carrying and storing carbide of calcium—in the form of packets, cartridges, or the like, into which the carbide is packed ready for placing in acetylene generators, and which, when the charge is used, may be readily removed.

The patentee proposes to make a spiral or coil of wire of the required diameter and length, having at the lower end a bottom preferably formed by the end of the wire itself. A paper bag (or cylinder) is placed either outside or preferably within the spiral, of a length equal to the coil spring when the latter is compressed to, or about, its closed position. The ends of the bag are held closed by the ends of the coil, but are capable of extension under the expansion of the carbide when gas is being generated. In some cases, from the sides of the coil are a number of spikes, prongs, plates, or the like, penetrating into the carbide for the purpose of loosening or opening it at various parts under the expansive force of the coil and the gas, so that the water may more readily and evenly find its way towards the centre of the body of carbide.

When the carbide has been used up in the generator, the removal of the wire coil, which has become expanded, brings away with it the refuse from the charge, so that the chamber is cleaned and ready for a recharge.

Acetylene Generators.—Söderberg, C. W., of Nordstrand, Norway. No. 14,499; July 13, 1899. Date claimed under International Convention, Dec. 14, 1898.

In this type of generator, the carbide is delivered in measured quantities into the water-receptacle by mechanism worked by the gasholder bell or by hand. Each time the bell approaches its lowest position, one of a number of carbide containers fixed upon the lid of the water receptacle is caused to discharge its contents. In the example shown, there



are nine such receptacles A, closed gas-tight above and limited below by moveable flaps B. The contents of each corresponds to the amount of gas in the holder. The carbide falls down the pipe L, which reaches into the water, so that gas from the gas-space of the generator cannot get up to the carbide receptacles fixed on the top of the pipe.

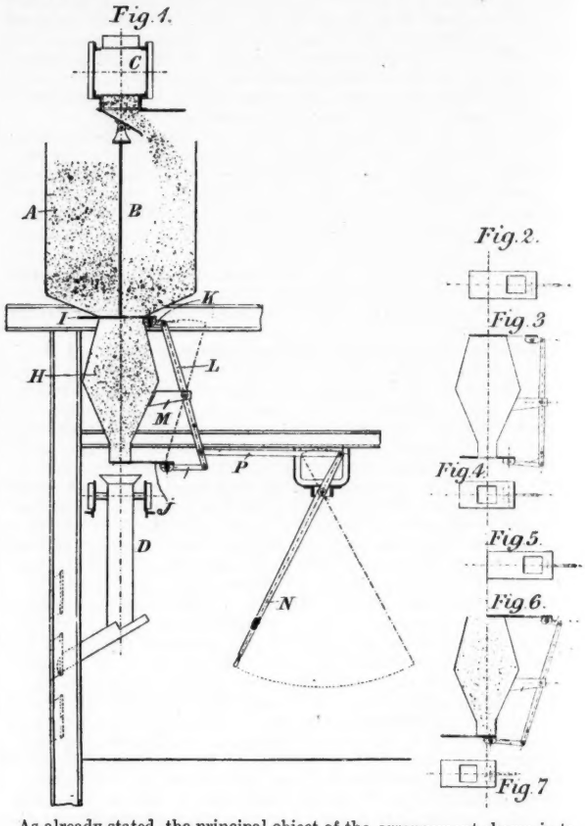
The spindles C, fixed in the flaps B, are (on the side towards the centre of the generator) firmly connected to disc-shaped levers, which rest with one corner against a horizontal disc moveable round a vertical pivot, so that the flaps are kept closed until the slot H in the disc allows it to open by its own weight, or by pressing on the arm J fixed thereon. This arm also serves to move the small plates K, which indicate whether the carbide container is full or empty. These little plates are pivoted to each chamber. When the chamber is full, the plate is upright; and when it empties itself, the arm J catches against its lower part, and turns the little plate into the horizontal position. By a further rotation of the disc, the flap just opened is closed; and the disc is prevented from turning in the opposite direction. The transmission of the motion of the gasholder bell to the generator is by a toothrack M. When the store of gas is diminished, and in consequence the bell sinks, this toothrack moves so that the flaps B are opened in succession. When the store of gas is again increased so that the bell rises, the latter exerts no influence upon the mechanism of the generator, as a pawl and pawl-wheel are arranged within the tooth-wheel, so that the latter runs loose on its spindle in one direction.

Storing and Discharging Different Classes of Coal in and from Overhead Hoppers.—Herring, W. R., of Edinburgh. No. 12,471; June 15, 1899.

This invention relates to means of storing separately different classes of coal in divided overhead hoppers, and discharging same through a common measuring chamber and shoot, combined or separately acting for either class of coal at the will of the operator.

The arrangement, which is more particularly applicable in connection with the charging of inclined retorts, primarily consists of a sub-divided overhead storage hopper fed by a conveyor provided with special discharging openings, whereby the coal can be discharged into either division of the overhead storage hopper by the movement of a hinged or pivoted discharging flap. By this means, one conveyor is made to transport different classes of coal, and (by the movement of the flaps) to discharge the same into the different hoppers or pockets provided for the various classes. At the base of the hopper, a measuring chamber or shoot is fixed; and by means of slides the contents of either hopper may be discharged through the measuring chamber at will.

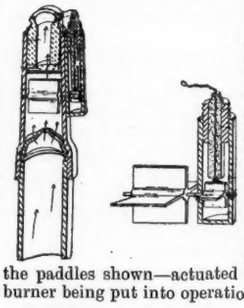
Fig. 1 is a vertical section of the conveyor, hopper, measuring chamber, and slides, traversing shoot, &c., and with other parts in elevation. Fig. 2 is a plan of the top slide for discharging from the measuring chamber. Fig. 3 is an elevation of the measuring chamber, with the top slides shut and the storage hopper closed therefrom, but the bottom slide open. Fig. 4 is a plan of the bottom slide in the central or discharging position. Fig. 5 is a plan of the top slide open for feeding the measuring chamber from the hopper. Fig. 6 is a vertical section of the measuring chamber, with the bottom slide closed and the top slide open receiving a charge from the hopper. Fig. 7 is a plan of the bottom slide closed, when working from the hopper.



As already stated, the principal object of the arrangement shown is to permit of one conveyor C being made to feed coal into two chambers of an overhead storage hopper or tank, and discharge into either one or other of the hoppers A or B. The measuring chamber H below has a slide I at the top and a slide J at the base, fitted to horizontal lever-arms K, pivoted to a lever L at the top and bottom, while the lever L is pivoted to a lug or limb M. The measuring chamber, in its discharge, is operated by a hand-lever N connected to the lever L by a horizontal bar P. Above the measuring chamber are the storage-hoppers divided by a vertical partition plate. Beneath the discharge openings in the trough of the hopper is fixed a horizontal plate upon a central shaft running the full length of the hoppers, and communicating with the point where the coal is received, so as to permit the operator deflecting the plate in order to discharge the different classes of coal into either hopper A or B.

Automatic Gas-Lighters.—Archer, D. J., of Toronto, Canada. No. 13,613; June 30, 1899.

The scope of this invention is sufficiently indicated by the claims advanced by the patentee and the illustration here given, accompanying his specification. The lighter is more particularly constructed for being attached to, or forming part of, an ordinary gas-burner; and the object aimed at is to provide a device that will automatically ignite the gas issuing from an ordinary burner without having to apply a flame to it. It consists essentially of a fine wire held in a suitable support, a portion of which, and its support, extends into the path of the gas as it escapes from the burner; while means are provided for causing friction against the ends of the wire by the paddles shown—actuated by the stream of ascending gas on the burner being put into operation.



Water-Meter.—Estill, H. van W., of Moberley, U.S.A. No. 13,355; June 27, 1899.

The objects of this invention are: First, to provide a connection by which the meter may be applied and removed through a single-threaded connection; secondly, to provide means whereby the supply and service pipes may be connected and used, even though the meter is dispensed with; and, thirdly, to produce a telescopic casing or box for accommodating the meter stationed at varying depths, and also in so forming

the parts that the joints of the sections may be caulked and rendered water-proof. A still further object of the invention is to produce a meter-box which "will possess advantages in points of simplicity, durability, and efficiency, in order that the cost of manufacturing the box and the elements co-operating with it may be comparatively small."

Ignition Apparatus for Gas-Jets.—Martini, A., of Berlin. No. 15,077; July 21, 1899.

This invention relates to improvements in ignition apparatus for use in connection with gas-burners, whereby the gas, upon being turned on, is directed upon a pillule of porous platinum or like material to effect the automatic ignition of the gas in the manner described in patents Nos. 22,901 and 27,198 both of 1898. The present invention consists merely in such modifications in the construction of such apparatus as will render their manufacture simpler and cheaper, while at the same time producing an apparatus effective and reliable in working. The earlier patents were described and illustrated in the "JOURNAL" for Sept. 5 (p. 600) and Sept. 26 (p. 767).

APPLICATIONS FOR LETTERS PATENT.

19,218.—GOULD, C. W., "Gas-stand." Sept. 25.
19,257.—MENGELBERG, C. E. L., "Producing calcium carbide." Sept. 25.
19,270.—BOULT, A. J., "Purifying water gas." A communication from J. E. Goldschmid. Sept. 25.
19,275.—SÖRENSEN, S. C., "Generating acetylene gas." Sept. 25.
19,281.—KOOPMAN, S., "The economic bright gas." Sept. 26.
19,291.—BELLAMY, A. R., "S arting gas-motors." Sept 26.
19,317.—LEWIS, J., LEESON, C., and GARNER, T., "An improved illuminating gas, and apparatus for the production thereof." Sept. 26.
19,345.—ADOLFSSON, A. E , "Generating acetylene gas." Sept. 26.
19,352.—REYE, M. G. W., "Creating large gasifying surfaces in small gasifying vessels, for the production of combustible gases." Sept. 26.
19,364.—SCHMIDT, C. V. G., "Acetylene generators." Sept 26.
19,375.—JONES, G., "Gas heating-stoves." Sept. 26.
19,377.—WIGLEY, P., and ARCULUS, E. A., "Incandescent gas-lamps." Sept. 26.
19,383.—EDGAR, W., "Anti-vibrator for incandescent gas-mantles." Sept. 26.
19,407.—MORAN, P. J., "Water-works systems." Sept. 27.
19,414.—LAJOIE, J. P., "Carbonic acid for heating devices." Sept. 27.
19,415.—LAJOIE, J. P., "Gas-engines." Sept. 27.
19,477.—SIMMANCE, J. F., and ABADY, J., "Street-lighting apparatus." Sept. 28.
19,486.—BATEMAN, F. E., "Incandescent gas lighting." Sept. 28.
19,536.—BOARDMAN, F. R., "Sealing or locking gas, water, and other cocks and valves." Sept. 28.
19,545.—SCHWINNING, H., "Dispersing or reflecting light for illuminating purposes." Sept. 28.
19,557.—THWAITE, B. H., and ALLEN, H., "Acetylene gas-generators." Sept. 29.
19,561.—AYKROYD, J. & B., "Acetylene generators." Sept. 29.
19,567.—BROOKS, J. B., and HOLT, J., "Governors for gas and other motors." Sept. 29.
19,596.—TEGETHOFF, W. C., and SEIDEL, W. H., "Gas-burners." Sept. 29.
19,606.—HEPKE, A., and BARSCHKE, H., "Automatic gas-ignition apparatus." Sept. 29.
19,641.—HINCHLEY, J. W., "Gas-engines." Sept. 30.
19,649.—RAE, T., "Gas and like engines." Sept. 30.
19,687.—WÜLFFING, C., "Manufacture of methane gas, or of gas mixtures chiefly containing methane." Sept. 30.
19,691.—STANDING, H. F., "Pressure-regulating valves." Sept. 30.

Failure of the Gas Supply at Cleckheaton.—Owing to the breakage of a gas-main on the night of last Saturday week, there was a failure of the gas supply at Cleckheaton. Fortunately it only continued for about half an hour; but much inconvenience was caused.

The Transfer of the Drogheda Gas-Works to the Corporation.—Our readers may remember that one of the Acts of last year was to sanction the purchase by the Corporation of Drogheda of the undertaking of the Drogheda Gas Company. The circumstances under which the matter was carried through were so unusual as almost to constitute a precedent. The Company promoted a Bill, which was petitioned against by the Corporation, who afterwards withdrew their opposition and co-operated with the Company in getting the Bill passed, paying their own costs. During the parliamentary proceedings, the price was agreed upon; and the purchase was completed on the 30th ult. by the payment to the Company of £21,000 for the works and £1250 for the stock—together, £22,250. The transfer took place without any ceremony; and all the officials are retained. The Company will be wound up by the Secretary, Mr. L. Donegan.

The Price of Gas at Stockton.—At the meeting of the Stockton Corporation last Tuesday, Mr. Meggeson, in pursuance of notice, moved a resolution, the effect of which was to increase the price of gas by 1½d. per 1000 cubic feet, instead of the 3d. which the Council in June last agreed should take place from the 1st of September. He remarked that if the Gas Committee would agree to this resolution they would still make a fairly good profit. There were many struggling tradesmen who had very high rates and very high gas bills; and it was the duty of the Corporation to take into consideration the interests of these people, and also those of the poorer classes. Alderman Hind, in reply, said that during the past five or six years the cost of the production of gas had gone up 5d. per 1000 cubic feet, owing to the increased cost of labour and coal; and yet they only asked the consumer to pay 3d. of this. They had reached the limit of production at the gas-works, and in two or three years they would have to spend from £15,000 to £20,000 or £25,000 in extending them. But would the consumer be responsible for this? The general body of the ratepayers would; and they wanted, therefore, some *quid pro quo* for that responsibility. Darlington had raised the price of their gas by 4d. per 1000 cubic feet. On Mr. Meggeson's proposal being put to the meeting, it was carried by 15 votes to 14.

CORRESPONDENCE.

[*We are not responsible for the opinions expressed by correspondents.*]

Hastings Carburation Process.

SIR,—I feel I must congratulate Mr. Young on his endeavours to make out a case for carburetted water gas in regard to naphthalene, and his continued evasion of the real points at issue. It is, however, evidently useless prolonging this discussion, as I am not prepared to go into the matter of the theory of the carburation process at the present time, and will content myself by saying that it is not a washing process to the degree Mr. Young would contend. Anyone who has tried washing coal gas with petroleum knows this; indeed, it should be self-evident from the small quantity of oil necessary in the process, which fact Mr. Young tries to meet by questioning our figures. This, I feel, is neither generous nor courteous; for, of course, the figures given are absolutely correct, and I may add that at a small works abroad—making coal gas only, and with naphthalene in a very difficult form—it was only found necessary to use at the start 1 gallon of oil for every 100,000 cubic feet of gas carburated. There is, of course, a slight solvent action, as was pointed out in the 1897 Institution paper; but even now Mr. Young will not discriminate between the drip-well on the carburater and the syphon or the town mains.

With reference to the explanation given by Mr. Young of the formation of naphthalene in the presence of carburetted water gas, I am forced to the conclusion that Mr. Young has not made himself very fully acquainted with the practical details of the manufacture of carburetted water gas. Your readers who have followed this discussion will remember that Mr. Young has erroneously attributed a part of the success of the carburation process to the use of semi-permanent (or very oily) water gas. But now, in order to account for the formation of naphthalene as above, he must needs make the assertion that the oil is being over-cracked by working at too high a temperature, so producing naphthalene—quite the reverse, be it noted, of his original comment; and not only myself, but other gentlemen who have been persuaded (?) to go in for the carburation process, are making this mistake. Mr. Young is certainly not complimentary.

The naphthalene to which I referred was deposited from the coal gas; but if Mr. Young's theory was correct, this could not be possible in the presence of carburetted water gas. The why and wherefore of this I have not now time to discuss; but I trust this correspondence may have produced some facts towards the elucidation of a very important subject, so that Mr. Young's interesting comments may not have been made without advantage.

CHARLES F. BOTLEY.

Hastings, Oct. 7, 1899.

The Consumption of Water per Head in Different Towns.

SIR,—With further reference to the discussion of some of the points raised by the paper on the above subject, and to the subsequent letters by "Student," I should like to bring to his notice Nos. 63 and 65 of the Model Bye-Laws of the Local Government Board. In the former, he will see that every person who shall erect a new building shall provide in every main drain which may communicate directly with a sewer into which such drain may empty, a "suitable trap at a point as distant as may be practicable from such building, and as near as may be practicable to the point at which such drain may be connected with such sewer or other means of drainage;" and in Part II. of the latter bye-law, in speaking of the air-inlet to the trap, that "he shall cause every opening, &c., to be covered with a suitable grating or other suitable cover, for the purpose of preventing any obstruction in, or injury to, any pipe—such grating or cover to be so constructed and fitted as to secure the free passage of air by means of a sufficient number of apertures," &c. In referring to the "mica-flap" in my letter of the 19th ult., I spoke of it as being the most efficient and up-to-date fulfilment of the foregoing bye-law.

Naturally, experiments taken as to the velocity of air rising from a vent-shaft at the head of a house drain must vary in accordance with climatic conditions. In a private drain of the usual size, I hardly think the temperature inside the drain and that of the outer atmosphere can be of much consequence; the chief extractor being doubtless the velocity of wind. My experiments were taken at different times, and in different atmospheric conditions; and I found the velocities varied from 15 to 45 feet per minute—the most frequent being from 30 to 40 feet per minute. At this time the air in the drain varied from 60° to 62°, and the outer air from 72° to 80°; the temperature of air in a drain being higher than that in a sewer, from which "Student" seemed to have taken his figures. For his benefit, may I observe that sewer gas being lighter than air naturally rises towards the summit, but that a flow of sewage is sufficient to alter the course of the air lying immediately above the water area. Hence in a sewer with no means of ventilation other than the ordinary ventilating street-covers, you will have two distinct courses of sewer gas—one with, and the other against, the flow. In a small sewer or private drain at the head of which ventilating shafts are erected, the sewer gas will be extracted from the sewer or drain for a considerable length; and hence the course of the air inside the sewer will be directly against the flow. I am glad to inform "Student" that I have never found the wind blow down a vent-shaft and, being pent up by the "mica-flap," unseal a modern intercepting trap with a 2½ or 3 inch seal. It is possible that one of the old iron "lip" gullies, with its accompanying shallow trap, might become unsealed from a variety of causes; but let us be up to date, particularly in drainage details.

I trust "Student" does not quote Lincoln as a model sanitary town. If he does, let me refer him to the paper read on "Domestic Sanitation," and the subsequent discussion thereon, at a meeting of the Sanitary Inspectors' Association held there in August last. This paper, giving a description of the Lincoln system, was most severely criticized by all members of the Association who spoke. Though they have no main intercepting trap in use, yet they advocate the adoption of traps on the soil-pipes and to the wastes from sinks, &c.; showing that they are alive to the utility and benefit to be derived by disconnection from the sewer.

In conclusion, I should like to obtain a list of the "many towns" where the intercepting traps which have been fixed are now being systematically taken out.

ASSISTANT.

Oct. 5, 1899.

MISCELLANEOUS NEWS.

COMMERCIAL GAS COMPANY.

The Metropolitan Gas Inquiry—The Allotment of Capital at Par.

The Half-Yearly Meeting of this Company was held last Thursday, at the Cannon Street Hotel—Mr. J. Blacket Gill in the chair.

The Secretary (Mr. H. D. Ellis) having read the notice convening the meeting, the report and accounts—extracts from which were given in last week's issue—were taken as read.

The Chairman said the report and accounts had been submitted to the proprietors; and he presumed they were familiar with the figures. Therefore he did not think he need occupy much time in going through them, except to congratulate the proprietors on the satisfactory half year. The gross income from gas, at 2s. 6d. per 1000 cubic feet, had advanced by £3340; and the sale of gas showed an increase of 2¼ per cent. The increase of the Gaslight and Coke Company was 1·6 per cent.; so that he thought they compared very favourably with their large neighbour. There was an addition of £110 to meter-rents, and of £122 to stove-rents. The coin meters and fittings rental had risen by £562; so that the total income exhibited an increase of £4063. But, on the other hand, under expenditure, the price of coal and oil had been somewhat more; and the consequence was that coal, cannel, and oil had cost them more by £6040. Residuals had served them pretty well; and as they had yielded more by £3202, this reduced the extra expenditure on coal and oil to £2838. Rents, rates, and taxes always had an aptitude for increasing; and they were up £538. Bad debts only presented the small increase of £36. The total expenditure had risen by £4472; and as the income had increased by £4063, the profit was less by £409. They wanted for the half-year's dividend and debenture interest £54,472; and as they had only got £53,549, there was a deficit of £923, which would be taken from the small reserve of undivided profit. He might say the works were generally in a very satisfactory condition. A considerable sum had been expended in extending their retort power at Wapping; and a good deal of money (as would be seen by the accounts) had been spent generally upon the works. Most unfortunately everything they had to deal with was at a high price. If there was anything like a wave of prosperity running through the country, for all the materials they had to use they had to pay dearly. As he had already said, he thought the accounts were satisfactory; and he was sure the proprietors would agree with him that they might congratulate themselves upon them. There was another question he desired to allude to; and this was the recommendations of the Select Committee of the House of Commons who were appointed to consider the charges made by the Metropolitan Gas Companies. They passed a series of drastic resolutions; he might almost have said "revolutions." He would read the first recommendation—

That whenever any of the Metropolitan Gas Companies again come to Parliament for an extension or alteration of their capital powers, a revision of the sliding-scale should take place, and that the standard price should be reduced to 3s. 3d. to carry the standard dividend of 10 per cent., and that the existing scale of increase and decrease of dividend of ¼ per cent. for every 1d. of decrease or increase of price below or above 3s. 3d. be maintained, and that a secondary or additional scale be imposed which should permit of an increase or decrease of dividend over and above that regulated by the present scale of ¼ per cent. for every complete 3d. of decrease or increase below or above the standard price of 3s. 3d.

Probably the proprietors would better understand this (or, at all events, those who were not gas experts) if he told them that, if the Company were working now under this recommendation, instead of being able to declare 13¾ per cent. (which was the statutory dividend, although they only proposed to declare 13¼ per cent.), they could only declare 13 per cent.; so that they would practically lose ¾ per cent. Now this appeared particularly unfair to the Commercial Gas Company, against whose conduct, in the exercise of their statutory powers, no allegation or suggestion was made before the Committee. He did think the Company could, if they came to a parliamentary inquiry, face it very well indeed. No company had ever striven to keep down their capital account more than they had done. He confessed when he read this recommendation he was much startled, and it gave him a rude shock, for he had fancied that their sliding-scale was inviolable; and it did appear to him that shareholders who had invested their savings upon the strength of an Act of Parliament had some cause of complaint when an Act of Parliament that most of them had regarded as something as immovable as the Bank of England should be altered in a fashion like this. Perhaps he ought not to say "altered," as these were only recommendations to the House of Commons to do so. But it seemed to him that the worst feature of it was that the alteration might not be lasting. If the House of Commons altered the sliding-scale this year, there was no reason why they should not alter it again next, and so on. It did not give that fixity of tenure which they were led to expect in connection with the sliding-scale. The Company took the sliding-scale in 1875, and the initial price was put at 3s. 9d.; and at that figure they were enabled to pay a 10 per cent. dividend. From that time to the present, 84 per cent. of any saving that had been effected had been given to the consumers and 16 per cent. to the proprietors; so that he thought he was justified in saying that the sliding-scale had worked satisfactorily for all parties. But to make this a little plainer, he would repeat the figures which the Secretary gave him at a previous meeting, because they always appeared to him (the Chairman) particularly suggestive on this point. They showed that, whereas since 1875 the proprietors had received £400,000 extra dividend, they had saved the consumers in the price of gas 2 millions of money. Therefore he considered this spoke well for the sliding-scale. As Parliament had taken it into its hands to do this thing, it became them, as proprietors in the Company, to consider carefully their position. They knew that by their Act, they were enabled, if they chose, to allot stock at par to the proprietors. They had enjoyed this now since 1875. In those times, now far off, it was not such a difficult matter for them. They were doing a large and increasing business, and they were enabled to get the money from the proprietors at par, and, having large undivided profits, they were in a position to keep up the dividend as they had done for many years. It would be quite understood, however, that the time had now come when they must look in the future for cheap capital. He might refer to a case in point. They had nearly 11,000 coin meters out to-day; and they had had an increase of almost 1000 since he last had the pleasure of addressing the proprietors. Their charge to the working man upon these meters was 4 per cent.; and to carry on this business (which was a large one, and required a large amount of capital), they had to pay something like 7 per cent. for the money. The reason would thus be readily understood why they could not go on in this way much longer. In consequence, the question had lately come before them—not before the Board, but they had considered it in their private capacities—whether the time had not come when an effort must be made to obtain cheap capital. Now he wished specially to guard against the idea that he had a resolution to propose. He might say at once he had not. The Directors talked about these things when they met each other; and some of them felt rather strongly that, at some future time, they might have to come before the proprietors and say: "You must have more capital; and the wisest and most prudent course we can adopt will be to issue our stock at the premium we can obtain on the market." For instance, they had £44,750 of 7 per cent. stock unallotted, and £44,880 of 4½ per cent. debenture stock. He was also reminded by the Secretary that they had in addition £20,000 of Ratcliff mortgage bonds, which they could call up if absolutely necessary. Now if the stock was put on the market in good times (which he hoped were coming some day), they would probably get a couple of hundred thousand pounds. With this, as the proprietors would see, they would be able to carry on for some years to come. It was an advantage in every way to give their Engineer (who had long laboured under the disadvantage of dear capital) cheap capital. At the same time, while they were not at all afraid of facing any parliamentary inquiry, the money which they would obtain by issuing the stock at a premium would prevent the necessity of having to go to Parliament for some years. There was another recommendation the Select Committee made, which was that every five years a company should go to Parliament for fresh powers—in other words, that they should not be granted fresh powers more than sufficient for five years. For a small Company like theirs, he was told by those who knew about these matters that it would cost them something approaching £5000 every time they applied to Parliament. This would be a serious thing for them; so that, from every point of view, he thought they should endeavour, if they could get cheap capital, to go on as they were now doing until they were compelled to go to Parliament. He had made these remarks because he wished the proprietors to turn the matter over in their own minds, in order that, when the time came for the Directors to ask for further capital, they would not be taken aback, but would look at the matter in the same way that he had done. In getting this cheap capital, they would enormously strengthen the position of the Company, and would be able to work better. The price of the stock in the market would not alter much, because they would have a longer time to go on without change; but without cheap capital he did not think they could really expect to go on in the prosperous career they had now pursued for many years past. He hoped, with regard to what he had said upon this question of capital, the proprietors would generally agree with the Board. They were all proprietors together; and the Directors were as much desirous as the ordinary proprietors for the prosperity of the Company. The way he had indicated was the only one in which they could hope in the future to continue the prosperous course of the past. He moved the adoption of the report and accounts.

The Deputy-Chairman (Mr. W. G. Bradshaw) seconded the motion.

Mr. E. W. Collyer inquired whether provision was made for the depreciation of coin meters, fittings, and other things of that sort.

The Chairman: We depreciate largely every year.

Mr. George Livesey said he quite approved of the suggestion that the proprietors should be asked to surrender their right to have capital allotted to them at par, on the ground on which the Chairman had put it. It was absolutely essential for the Company that they should have cheaper capital. The fact that all their capital for extensions of business and for the provision of slot meters cost something like 7½ per cent., whereas other companies could get it at 3½ per cent., handicapped their Company very seriously; and he (Mr. Livesey) was only supporting what he had advocated on previous occasions when he said that the shareholders should be willing to surrender what might be their immediate interest for the sake of the ultimate benefit of the Company. Gas shareholders did not, as a rule, speculate. They bought stocks and shares for the purpose of investment and held them; and therefore a temporary loss like this would inure in the end to the general benefit of their property. There he was entirely at one with the Chairman; but he was not so thoroughly at one with him on the other point—that they should surrender or give up the £100,000 (they had not yet consented to do so, nor had they yet expressed an opinion) without something in the shape of a *quid pro quo*. If the shareholders gave up their right to the allotment of capital at par, in the way that was, he thought, provided by the Companies Clauses Act, by resolution at a meeting, they could do it, and surrender it for nothing. But he merely put it to the Directors whether it would not be advisable to go to Parliament next session, and say to Parliament: "Here we have £100,000. We are willing to surrender it; but we want some consideration for what the proprietors are giving up." And he thought what they might ask Parliament to agree to would be something in the nature of a consideration in regard to the initial price. He knew that sometimes Parliament was regarded as a great bogey; and the idea was to keep away from Parliament as long as possible. He did not regard Parliament with any fear. He would rather take a bold course, and, adopting as far as he could the recommendations of the Select Committee, go, with this surrender in his hands, and ask for some consideration in the matter of the initial price. He might say in respect to this matter that no one had contended more than he had for the inviolability of the initial price. It had been inviolable for 24 years; but this year that inviolability was broken through. A Suburban Gas Company—the Lea Bridge Company—were in Parliament this session, and they gave up 6d. of their initial price, or rather it was taken away from them by a strong Committee of the House of Lords, presided over by Lord Camperdown. Their able Engineer (Mr. H. E. Jones) did his best to turn the Committee from taking such a course; but Lord Camperdown was inexorable. It struck him (Mr. Livesey) at the time that the only and wisest course for the Company to take would have been to withdraw the Bill. Two of the

Directors of the Lea Bridge Company were Directors of the Gaslight and Coke Company; and one would have thought that they would have known something about the necessity of standing by the initial price. The fact, however, that it was altered would be made use of to the utmost by Parliamentary Counsel. When a sliding-scale company was in Parliament in the future, this fact would be brought forward; and Counsel in their usual unscrupulous way would not state the special circumstances of the case. He used the word "unscrupulous" advisedly. Counsel did not mince matters; they were unscrupulous. They would ignore the special circumstances, and quote the case as a precedent. He was afraid Parliament would be much impressed by that precedent, followed as it had been by the distinct recommendation of the Select Committee. He (Mr. Livesey) therefore suggested for the consideration of the Directors and proprietors whether it would not be wise to look at this matter from the point of view he had indicated—they had £100,000 to give up, but they should not give it up for nothing. They should go to Parliament and say: "We have this £100,000 to surrender, but we expect some consideration for it." If they waited four or five years, nobody even knew that there would be a sliding-scale. It had been broken through now, and might be gone altogether four or five years hence. If the Company went to Parliament next session, they might get a settlement that would last them a considerable time; and that settlement, after the recommendation of the Committee last session, Parliament would not be likely to alter again very soon.

Mr. Ennis suggested that the Chairman should at the next meeting inform the shareholders the approximate date when the Company would be compelled to go to Parliament. They had £100,000 of unissued stock, and some of it—at all events the £20,000 of mortgages—might be placed at less than 5 per cent., say 3 per cent., or thereabouts. He was glad to hear Mr. Livesey's remarks, and to be able more or less to concur in his views—that was to say, he thought there might be a great deal in his suggestion to go to Parliament if they must surrender something; and he was glad Mr. Livesey had come round to the view that they ought to have a *quid pro quo* for what they surrendered. If they went to Parliament, he hoped the Directors would do so with the intention of withdrawing the Bill if they did not get a *quid pro quo*. He also expressed the opinion that, in the event of an application to Parliament, they might go for a 3 per cent. debenture stock, and stock-splitting clauses.

The Chairman said they were always pleased to see Mr. Livesey at their meetings, and to hear any remarks he had to make. If he might venture to say so, he thought Mr. Livesey had answered himself. He started with the idea that it would be prudent for the Company to go to Parliament next session; and soon after that he spoke very strongly as to the inexorable will of Lord Camperdown and other gentlemen, and that there was every probability they would have their initial price reduced. Their object was to keep away from that. They did not want the sliding-scale reduced. They wanted to have their 13¾ per cent; and if they followed Mr. Livesey's advice, there would be a very good chance of them never sitting there again with a 13¾ per cent. dividend. With great respect, he thought their course—surely it was their prudent course—was to keep away from Parliament as long as they could. Mr. Livesey said that perhaps, in four or five years' time, the sliding-scale might be a thing of the past. The probability was they would not have to go to Parliament for five or six years; and his feeling was that they might let other people take the "chestnuts out of the fire." Why should the Commercial Company? Their best course was to get cheap capital, and strengthen the concern, and keep clear of Parliament. The Company's stock would be even more sought after if people knew they were going to get cheap capital for some years to come. With regard to Mr. Ennis's remarks, he desired to say that, so far as he knew, at present there were no claims upon them for capital expenditure. They had only about £1800 overdrawn; and he thought that probably they would not have to increase the capital expenditure for some time.

The motion was then unanimously carried.

Dividends were next declared at the rate of 13¼ per cent. per annum upon the old stock, and of 10½ per cent. per annum upon the new stock, both less income-tax.

Mr. Samuel W. Savage (Secretary of the London and Blackwall Railway, and an Auditor of the Oriental Gas Company) was unanimously elected Auditor in the place of the late Mr. George Ilsley, to whose death the Chairman made sympathetic reference.

Mr. Simpson Rostron proposed a vote of thanks to the Chairman and Directors; taking the opportunity of remarking that he differed from the Chairman with regard to his policy as to going to Parliament.

Mr. A. H. Baker seconded the proposition, which was cordially agreed to.

The Chairman, in responding, observed that Mr. Livesey had mentioned a *quid pro quo*. He was wondering whether Mr. Livesey could not, by giving up something, get a *quid pro quo* in the shape of a reduction of the illuminating power by a candle. If he could do this, they would raise a statue to him.

Mr. Livesey said the *quid pro quo* was just an idea of his; and, if he were in the place of the Directors, he would try to get it.

The services of the officers and staff having also been recognized,

Mr. H. E. Jones acknowledged how much the staff and the workmen were obliged to the proprietors for their confidence, and for their good treatment of them. This good treatment meant a great deal more income to the workmen than formerly; and they worked very well under it. Occasionally a number of them had to give up, and had to be put on pensions; and the liberality of the proprietors and the Directors enabled him to put an old man who had been working perhaps 25, 30, or even 40 years for the Company in such a position that he need not go to the workhouse—and this without waiting for Mr. Chamberlain's old-age pension scheme. To be able to do this gave him (Mr. Jones) additional pleasure in his work. There was one thing which troubled him, and added to his responsibility just now, and that was that they could not get anything reasonably cheap—whether it was coal, iron, oil, meters, pipes, or anything else. They had all gone up in price by "leaps and bounds," in conformity with the advance in trade throughout the country. He did not like this, because he could not put up the price of gas automatically as trade went on; and he hoped some of his influential friends—because there were some very influential names mixed up with such things as meters and pipes—would take notice that the Company would not go on paying for ever the high prices now demanded. If the present state of things continued, he (Mr. Jones) would ask the proprietors to allow him to make his own meters and stoves, and perhaps employ lead for pipes. He should like to say a few words upon the point that had been raised as to a *quid pro quo* for any surrender the proprietors might make in the matter of the bonus and allotments of capital, which had been no light burden for the staff for 25 years. Mr. Livesey knew that he (Mr. Jones) was the only Engineer of a Gas Company requiring to spend capital who had had to pay the old-fashioned price for his capital since 1875. Theirs was the very last Company who got that advantage; and they obtained it by taking from the Committee the sliding-scale which Mr. Livesey and the then Mr. Farrer had organized. It had, however, been no light burden for him (Mr. Jones). And when he saw some of the younger companies with whom he was associated—when he saw his little Wandsworth Company increasing their business with capital at 3½ per cent., and selling gas at 2s. 2d. per 1000 cubic feet, while he was obliged to ask for 2s. 6d., it made him realize that the burden could not always be carried, and must be removed. When he was before the inquisition—the searching inquisition to which reference had been made—he was asked why he did not supply gas as cheaply as Mr. Livesey; and his answer was because he was not Mr. Livesey, and it was not fair to expect an average man to compete with Mr. Livesey.

Mr. Livesey: Did not they ask why you could sell gas 6d. per 1000 cubic feet cheaper than the Gaslight and Coke Company? (Hear, hear.)

Mr. Jones said he tried to make a long speech; but, like the German, he said "nodings all ze time." He practically had to say he could not make gas as cheaply as Mr. Livesey under present circumstances. He had to confess to one gentleman that, while they were lending coin meters and fittings at a 4 per cent. charge, they had to raise the money (it was put very pointedly to him) some at 10½ per cent., and some at 4½ per cent. He must say this, that, if the Company wanted to extend their business (the district was, of course, circumscribed), they must extend downwards, and they must extend by means of coin meters. They had now 11,000 of these meters in use; and they might have 22,000 if they would give him cheap money to do it with. The working man asked the Company not only to bring the gas to his door, but to take it into his house, and to fit it up into the bargain. It seemed to him, and he believed, that Parliament would (whenever the Company went to them for their necessities) regard any surrender the proprietors might make with the most favourable eye—whether they took what they had to surrender to Parliament, and said "Give us something for it," or whether they were able to say "We have already divested ourselves of it." He had still confidence in Parliament. With reference to the remarks which had been made as to the revision of the sliding-scale, the Committee, he might point out, gave the gas companies some compensation in the proposed increase of dividend over and above that regulated by the present scale of ¼ per cent. for each complete 3d. reduction on the standard price. This would put the South Metropolitan Company and another Company he knew of in a position that they (the Commercial Company) might just as well be in, and which they could be in if the proprietors would give him cheap money—if they would give him the means by which a large increase of business might be got. This would have the effect of increasing the output, which would enable them to reduce the price; and then they could go to Parliament and find, under that recommendation, that (another 3d. would do it) they would get nearly, if not quite, as good a dividend as they had now. At one time, he thought that reductions in the price of gas could go on almost for ever. The late Chairman (Mr. R. Bradshaw) once asked him whether he did not think 2s. 6d. was a low price. He replied that he did not; nor that 2s. was a low price—in fact, he did not see why it should not be 1s. 6d. if residuals sold well. But, as he had already said, they had certain burdens to bear; and they wanted cheap capital to get rid of those burdens. He again thanked the proprietors for their confidence.

Mr. Ellis also responded; and the proceedings terminated.

ALLIANCE AND DUBLIN CONSUMERS' GAS COMPANY.

The Half-Yearly General Meeting of this Company was held on Saturday, the 30th ult.—Mr. Charles Lawler, J.P., in the chair.

The Secretary (Mr. F. T. Cotton) having read the notice convening the meeting, the report of the Directors, with the accounts for the six months ending June 30, was presented. It was stated therein that the receipts amounted to £145,329; while the expenditure (including £5756 for interest on debentures) came to £108,124—leaving a balance of £37,205 to be carried to the profit and loss account. Adding £1442 brought forward, there was a sum of £38,647 available for distribution; and the Directors recommended the payment of the usual dividends at the rates of 10½ and 7½ per cent. per annum. This would absorb £33,567, and leave £5080 to be carried forward.

The Chairman, in moving the adoption of the report, remarked that in the six months covered by the accounts there had been carbonized 3970 tons of coal more than in the corresponding period of 1898, and 26,372,000 cubic feet more gas made; and the sales had produced an increased revenue of £5020. This was attributable to the additional number of gas cookers, heaters, and engines in use, the demand for which continued. The market for residuals had taken an upward turn; and £4530 more was received for coke than in the first half of 1898. There had also been received £1454 more for sulphate of ammonia, and £590 more for tar. But against these increases they had to pay a higher price for coals. The Directors recommended payment of the usual dividends, after which a sum of about £5080 would remain to be carried forward. Doubtless some of the proprietors might think this ought to be placed to the credit of the reserve, having regard to the many occasions the Directors had had to resort to the fund in recent years to make up dividends. The Board thought, however, that, in the interests of their customers, the question of augmenting the reserve fund might be postponed for the present. Twelve months ago, owing to the increased price of coal and the serious depreciation in the value of residuals, the Directors were afraid they would have to raise the price of gas. Happily this necessity had not arisen. There would not be any increase, but, on the contrary, the Directors had decided on making a reduction of 1d. per 1000 cubic feet, to take place from the December quarter. This, though it appeared small, amounted to a considerable sum upon the Company's total rental. The Directors hoped,

however, if the prices of materials remained as at present, to be able, by the introduction of carburetted water gas, to make a further reduction. At the meeting this time last year, he drew attention to the small number of cookers in use in Dublin compared with other cities in England. From that time the demand had increased so much that the Directors unfortunately had not been able to meet it, in consequence of not being able to get materials, or men to work upon them, as it was absolutely necessary to have qualified and experienced operatives for this class of work.

The Deputy-Chairman (Mr. J. R. Wigham) seconded the motion; and it was carried unanimously.

The dividends recommended having been declared,

Mr. D. Drummond proposed that the salary of the Secretary be increased to £600 per annum. He pointed out, in support of his proposition, that the proprietors were indebted to the Secretary for the development of the day consumption of gas which had lately taken place, and which would ensure the payment of the regular dividends notwithstanding the competition of other systems of lighting.

Mr. Pim, in seconding the motion, endorsed the remarks of the mover.

The Chairman said he could support all that had been stated in respect of the Secretary. Mr. Cotton was not only fully qualified to discharge the secretarial duties, but also possessed a special knowledge of engineering, gas making, and electricity; and he had rendered great assistance in developing cooking and heating appliances, as well as in the distribution of gas. He (the Chairman) considered that in passing the resolution, they would be only doing the Secretary simple justice.

The resolution was unanimously carried.

Mr. Cotton said he could not sufficiently express his gratitude to the shareholders for their generous treatment of him. He assured them that he would do everything in his power to merit it.

A vote of thanks was then accorded to the Chairman and Directors; and the compliment having been acknowledged, the proceedings closed.

PROPOSED NEW MONEY POWERS FOR THE SALFORD GAS DEPARTMENT.

At the Meeting of the Salford Town Council on Wednesday, the Parliamentary and Public Trusts Committee recommended the Council to promote a Bill in the next session of Parliament for power, among other purposes, to borrow £200,000 for gas-works requirements. In explaining the position of the Gas Committee, the Chairman (Alderman Phillips) pointed out that the Corporation promoted Bills in 1897 and 1899; and, as a matter of fact, they were never long without requiring a Bill for something. In 1897, £85,000 was asked for to meet the ordinary developments of the gas-works; and by March 25 next this sum would be reduced to £25,000. As the operations of the Committee were increasing at a very rapid rate—the rate of increase for a short period in the last report was about 12 per cent. as compared with the corresponding period of the previous year—it was quite evident that in a short time the Committee's work would be brought to a standstill unless they could get further powers. The Local Government Board had suggested that they should now ask for a considerable amount of money to last them for some years to come, and thus enable them to go on developing quietly without making further applications. Under those circumstances, the Gas Committee had agreed to ask for the promotion of a Bill for £200,000, the expenditure of which sum would only, however, be undertaken as required from time to time, and with the sanction of the Council. Mr. Stephens said that if the Corporation promoted a Bill to borrow £200,000, for which they paid £3000, the cost would be equivalent to 1½ per cent.; making, with the 3 per cent. to be paid in interest, 4½ per cent. in all. He considered the Corporation ought not at the present juncture to be committed to another Parliamentary Bill, having just secured one at an expense for the last twelve months of £60 or £70 per week. Alderman Snape was of opinion that the matter might be adjourned for twelve months; but Alderman Phillips denied the Committee would be able to continue for that length of time without further powers. In the result, the Committee's recommendation was adopted.

PROPOSED PURCHASE OF THE COLWYN BAY GAS-WORKS BY THE LOCAL AUTHORITY.

Local Government Board Inquiry.

Last Thursday, Colonel A. C. Smith, R.E., held an inquiry, on behalf of the Local Government Board, at the Council Offices, Colwyn Bay, into an application made by the Colwyn Bay and Colwyn District Council for authority to purchase the undertaking of the Colwyn Bay and District Lighting Company. Mr. Chamberlain (of Messrs. Chamberlain and Johnson) appeared in support of the application, and stated that in 1891 the census of the urban district showed a population of 5247. It was now estimated to be more than 8000, while the summer population was reckoned at between 16,000 and 17,000. The assessable value was £43,000. The Company's Act was dated July, 1896, and at that time they had a share capital of £8000, and a mortgage debt of £2000. At the present time the capital was £35,000. The works were favourably situated for the supply of the district, being at about the lowest level, close to the line of railway, and sufficiently distant from the populated centre of the town to obviate any complaint on the score of nuisance arising from the manufacture of gas. The site of the works was freehold, about 2 acres in extent; and under their Act the Company had powers to acquire a further plot of 2½ acres along the present site, for future extension. There was a house for the manager, stabling for horses, and all the usual buildings and accessories of a gas-works. The new retort-house was built in 1897. In 1898 the make and sale of gas reached 23,811,000 and 20,647,300 cubic feet respectively; and in the current year they were expected to reach 25 and 28 millions. The number of gas consumers was 579, and there were 211 who had gas cooking-stoves in use. The price of the gas was 4s. 2d. per 1000 cubic feet for lighting, and 3s. 4d. for cooking. Mr. G. Bevan (Chairman of the Council) gave evidence in support of the application. He said he thought it would be in the best interests of the district that the gas undertaking should be in the hands of the Local Authority. Mr. W. Jones, the Engineer to the Council, expressed the opinion that, in view of the great prospective increase of the district, it was advisable to acquire the control of the gas-works. The wisdom of such a course was proved by the experience of such Corporations as those of Bangor, Carnarvon, Conway, Llandudno, and Rhyl. Mr. Joseph Hepworth stated that in his experience the acquisition of gas undertakings had invariably been of great benefit to local authorities. He had never heard of a case that had proved a loss. He some years ago advised the Colwyn Bay Council to purchase the present works, and a clause was then agreed upon, and inserted in the Company's Act, making it possible to purchase on valuation within a period of five years. In no case where electricity had been introduced had the consumption of gas decreased. Witness was cross-examined at great length by Mr. W. Davies, a dissentient member of the Council, who endeavoured to show that an electric lighting scheme would result in a reduction in the value of gas shares. Mr. Davies then gave evidence against the application, and expressed the opinion that the Council should undertake a comprehensive scheme of electric lighting. He was afterwards cross-examined by Mr. Chamberlain as to his attitude on most public questions, and his consistent disagreement with the other members of the Council. Mr. J. Roberts, one of the largest property-owners in the district, and the oldest member of the Local Authority, supported the application. He said he believed that under the control of the Council the gas undertaking would prove a paying concern. Owing to the large area of the district, he did not think it possible to go in for an electric lighting scheme, as the expense of laying such a great length of main would be heavy. The Llandudno electric lighting scheme had cost £30,000; and a similar one for Colwyn Bay would certainly cost £35,000. Mr. Greenfield, a ratepayer, expressed the belief that all works of this kind should be in the hands of the Local Authority. What was wanted was gas-works, electric light works, and a destructor, in combination; but local circumstances made it impossible to have this at Colwyn Bay, and therefore he opposed the suggested purchase of the gas-works. Mr. Davies asked if it were possible to take a ballot of the ratepayers on the matter before the purchase was made. The Inspector replied that he could not give any advice on that point, as it was for the local people to make their own arrangements. Even if the Board agreed to the proposal to purchase, another inquiry would be held when the loan was applied for, and the application could then be opposed. This closed the inquiry.

THE GAS-RATE WAR IN NEW YORK.

Reference has already been made in the "Journal" on several occasions to the above subject; and we have been expecting from week to week some definite particulars from our American contemporaries as to the progress or the termination of the war. It may be remembered that the struggle commenced last May by the Gas Companies supplying Greater New York cutting their prices down to 50 cents per 1000 cubic feet. Since then, according to the "American Gaslight Journal," the contest has gone on; and at the present time the situation may be said to partake of the tragic and the comic, inasmuch as those who control the Gas Companies, who were "suddenly bereft of their reason" a few months ago "show no signs of returning sensibleness." The above-named publication says: "Many conclaves have been held by the local gaseous cardinals; but the results of them all seem to have been conclamation rather than concordance, and the bewildered shareholders are in a state of stupefaction at witnessing thousands thrown away by their representatives. Perhaps 'thrown away' is a bit of exaggeration in expression, because the thousands have been saved to the customers of the Companies by the action of the Companies' Directors; so we have a further exemplification of the adage that 'it is an ill wind which blows nobody good.' Apart from speculation, or any deeper consideration respecting the directing motives of those in charge of the gas supply of New York, it is difficult to conceive why hard-headed business men in other lines become so completely soft-headed when it comes to their dealings with or in gas trading. Any business pursuit has its fair limits as to the profit that may be made out of it; and while the gas business in the past—even in the near past, if you will—in New York has yielded good returns to those engaged in it, anyone at all conversant with the trade knows that, at present prices here, remembering always the quality of the gas supplied, even the Consolidated Company cannot more than 'make a living' and pay their just debts. Such being the case (and we challenge anyone to contradict us and subsequently justify or prove the contradiction), what must be the position of the New Amsterdam Company, which has bonded itself for very much more than it is worth? And where will the 'innocent shareholders' of that Company be placed when the bondholder seeks his due? *Dies iræ!* A more miserable situation in commercial trading never was shown, and its extremity seemingly begins with the wonderful masterstroke executed by those who listened so eagerly to, and acted so hastily upon, the arguments advanced by M. le Baron Jerzmanowski in the summer of 1897. To put the thing in plain English, the New York City gas situation has got beyond the comedy stage, and if the *farceurs* who are managing the New Amsterdam Company's campaign do not soon return to reason, there can be but one outcome to the contest, and that outcome will be the establishing in the city of a permanent gas-rate not to exceed 65 c. per 1000 cubic feet."

THE APPEAL IN THE HULL GASHOLDER CASE.

The following excerpt from an article in the "Law Times" for the 30th ult., upon the case of *Jordeson v. Sutton, Southcoates, and Drypool Gas Company*, will be of interest to our readers. After remarking that the action raises an interesting question as to the effect of underground water upon rights of support, and stating the material facts of the case and the terms of the judgment (which have already been fully reported in the "Journal"*), the article proceeds—

It will be seen that the Master of the Rolls has based his opinion, not upon the subsidence caused by the actual removal of water, but upon the

* See "Journal," Vol. LXXIII., pp. 807, 992, 1381.

shifting of the sand. By doing so, he freed himself from the control of the case of *Popplewill v. Hodgkinson*, which, it is submitted, is an authority of considerable value. There the plaintiff became entitled to certain land which was of a wet and spongy nature, and upon which he covenanted to, and did in fact, build certain cottages, but without previously draining the land. Certain adjoining land, also of a boggy nature, became vested in trustees, who, for the purpose of building a church, drained the moisture away, and in so doing caused the plaintiff's cottages to subside. Held, by a Court consisting of Lord Chief Justice Cockburn and Justices Keating, Lush, Hannen, and Brett, that the plaintiff was not entitled to recover for any damage caused by the subsidence.

The following remarks from the judgment are of great interest: "It may be, indeed, that where one grants land to another for some special purpose—for building purposes, for example—then, since according to the old maxim a man cannot derogate from his own grant, the grantor could not do anything whatever with his own land which might have the effect of rendering the land less fit for the special purpose in question than it otherwise might have been. In the case put by Mr. Holker, with regard to Chat Moss, possibly, therefore, his observations might be well founded. If the owners of that moss were to drain it to such an extent as, by the amount of water drawn off, to loosen the foundations of the railway which runs across it, and for the purpose of which they had sold a portion of it to the Railway Company, that might be an act in derogation of their own grant, and one, therefore, for which they might properly be made responsible."

Again, in the case of *Elliot v. North-Eastern Railway Company* (8 L. T. Rep. 337; 10 H. L. 333), which, strange to say, does not appear to have been cited during the argument in *Jordeson v. Sutton*, the defendant Company had taken over certain land under which there was a flooded coal mine. The shaft of the mine was filled with water to a depth of 80 fathoms, the hydrostatic pressure from which gave considerable support in the lower levels to the Company's land. It was decided that the subsequent removal of this water by pumping gave the Company no right of action.

When we look at *Jordeson v. Sutton* in the light of these decisions of the High Court and the House of Lords, it becomes apparent that there has been a new departure in the law. The effect of the judgment is that, assuming water only to have been abstracted from beneath the plaintiff's land, a distinction is to be drawn between water contained in a bed of shifting silt and that which fills the crannies and crevices of the rocks. If this decision is to stand, the lawyers must in future say to the hydrogeologist: "Come over and help us," whenever any subsidence is caused in the surrounding country by pumping operations.

It should be observed that the theory which has up to the present been regarded as correct—namely, that a man may pump water from his own land to any extent—is based upon the fact that the mere pumping of percolating water from one's own land occasions nothing more than *damnum sine injuria* to the occupiers of neighbouring tenements. To establish this proposition it is sufficient to mention the famous case of *Chasemore v. Richards* (7 H. L. 349). Assuming, then, that A is entitled to pump water from beneath his land, and that B, his next-door neighbour, is, according to the new decision, entitled to restrain him from doing so on the ground of injury caused by subsidence, A and B are brought to a deadlock. Which right is to preponderate? Even in the present case, where the Gas Company took every precaution to prevent the flow of water, they have been held liable.

It will readily be seen how important this question is likely to become should the principle laid down in *Jordeson v. Sutton* meet with any further extension. It might easily be urged that the withdrawal of water from a disused coal mine, or, indeed, from any underground cavity, is governed by the same rule as that which has been held to apply to water in a silt bed. Abandoned or worked-out mines are of all too frequent occurrence, especially in districts where new shafts are being daily driven; and if the withdrawal of moisture from a silt bed causes the silt to shift, surely the removal of water from the lower levels of a coal pit must cause the superincumbent strata to "shift" in such a manner as to lower the surface?

The American case of *Cabot v. Kingman* (166 Mass. 403), to which the Master of the Rolls made reference in his judgment, can hardly be regarded as a very satisfactory authority. Of the seven Judges who heard the case, no less than three dissented from the opinion expressed by Chief Justice Field. The facts were shortly as follows: An action was brought against the Sewerage Commissioners for injury to the plaintiff's premises by the negligent removal of soil in constructing a sewer in Chelsea (Mass.). The soil consisted of about 3 feet of gravel, resting upon about 10 feet of peat and silt, below which was very fine sand and silt, or quicksand. In the sand there was a large amount of water; and the trench was kept free from water by means of buckets and pumps. It was proved that large quantities of the plaintiff's soil were removed by this means; so that the surface of his premises being deprived of their subjacent and lateral support, cracked and settled, and his buildings were injured. The Master of the Rolls quoted the following passage from the judgment: "Whatever may be true of percolating waters, we think that the defendants had no right to take away the soil of the plaintiff in land which they had not taken under the statutes, and that it is immaterial that the soil was removed by means of pumps from the trench into which it had fallen by its own weight, or had been carried by percolating water. We are unable to distinguish the case from one where the soil falls in from the surface in consequence of an excavation in the adjoining land. The plaintiff, if the facts be as he offered to prove, has been deprived of the lateral support to his land, in consequence of which the quicksand has run from under the surface of his land into the trench, and has been removed by means of pumps; and this has caused the surface to settle and crack. It was the duty of the defendants to prevent this in some manner if they did not take the plaintiff's land." From the full report of the case it would seem that "soil" was removed in the form of liquid mud. If that is so, the decision is distinguishable from that in *Jordeson v. Sutton*.

We have said that Lord Justice Williams dissented from the judgment of the majority of the Court of Appeal; coming to the conclusion on the evidence that the subsidence had been caused by the withdrawal of water and not otherwise. "To affirm," said he, "the right of support from water is to affirm that no land can be drained, or well or trench dug, without the risk of an action for letting down the surface of neighbouring land."

The case is admittedly one of great difficulty; but it is unfortunate that in deciding as it has done, the Court of Appeal has to some extent interfered with the right which every man has to sink a well in, and pump water from beneath, his own property.

THE MOTIVE POWER OTHER THAN STEAM FOR LIGHT RAILWAYS.

In the "JOURNAL" for the 29th of August we gave some extracts from an Order made by the Light Railway Commissioners, under the Act of 1896, authorizing the construction of light railways between Barking Town and the Beckton Gas-Works. The portions of the Order reproduced had reference to interference with gas and water pipes during the construction of the works. Other Orders which have been made by the Commissioners contain the following provisions as to the use of motive power other than steam:—

If the motive power used upon the railway be a mechanical power other than steam, but including electricity, the following provisions shall apply.

1.—Such mechanical power shall not be used except with the consent of, and according to a system approved by, the Board of Trade.

2.—The Board of Trade shall make regulations for securing to the public all reasonable protection against danger arising from the use under this order of such mechanical power, and for regulating the same.

3.—If the company use such mechanical power as a motive power contrary to the provisions of this order or the Board of Trade regulations, they shall for each offence be liable on summary conviction to a penalty not exceeding £10, and also in the case of a continuing offence to a further penalty not exceeding £5 for every day during which such offence continues after conviction thereof.

4.—The Board of Trade, if they are of opinion (*a*) that the company have made default in complying with the provisions of this order or of the regulations, whether a penalty in respect of such non-compliance has or has not been recovered, or (*b*) that the use of such mechanical power as a motive power, as authorized under this order, is a danger to the passengers or the public, may by order either direct the company to cease to use such mechanical power as a motive power, or permit the same to be continued only subject to such conditions as the Board may impose; and the company shall comply with every such order.

5.—Any person owning, working, or running carriages on the railway, or any portion thereof, shall be subject to the provisions of this order (including the penal provisions thereof) relating to the use of such mechanical power as a motive power, in the same manner and to the same extent as the company are subject to these provisions.

The following provisions apply to the use of electric power under the Order, unless that power is entirely contained in, and carried along with, the carriages.

1.—The company shall employ either insulated returns or uninsulated metallic returns of low resistance.

2.—The company shall take all reasonable precautions in constructing, placing, and maintaining their electric lines and circuits, and other works of all descriptions, and also in working their undertaking, so as not injuriously to affect, by fusion or electrolytic action, any gas or water pipes or other metallic pipes, structures, or substances, or interfere with the working of any wire, line, or apparatus from time to time used for the purpose of transmitting electric power, or of telegraphic, telephonic, or electric signalling communication, or the currents in such wire, line, or apparatus.

3.—The company shall be deemed to take all reasonable precautions against interference with the working of any wire, line, or apparatus, if and so long as they adopt and employ, at the option of the company, either such insulated returns or such uninsulated metallic returns of low resistance, and such other means of preventing injurious interference with the electric wires, lines, and apparatus of other parties and the currents therein as may be prescribed by the Board of Trade regulations; and in prescribing such means the Board shall have regard to the expense involved, and to the effect thereof upon the commercial prospects of the undertaking.

4.—At the expiration of two years from the commencement of this order, the provisions of this section shall not operate to give any right of action in respect of injurious interference with any electric wire, line, or apparatus, or the currents therein, unless in the construction, erection, maintaining, and working of such wire, line, and apparatus all reasonable precautions, including the use of an insulated return, have been taken to prevent injurious interference therewith and with the currents therein by or from other electric currents.

5.—If any difference arises between the company and any other party with respect to anything hereinbefore in this section contained, such difference shall, unless the parties otherwise agree, be determined by the Board of Trade, or, at the option of the Board, by an arbitrator to be appointed by the Board; and the costs of such determination shall be in the discretion of the Board or of the arbitrator, as the case may be.

6.—The electric power shall be used only in accordance with the Board of Trade regulations, and in such regulations provisions shall be made for preventing fusion or injurious electrolytic action of or on gas or water pipes or other metallic pipes, structures, or substances, and for minimizing, as far as is reasonably practicable, injurious interference with the electric wires, lines, and apparatus of other parties, and the currents therein, whether such lines do or do not use the earth as a return.

7.—In this section, the expression "the company" includes any company or person owning, working, or running carriages on the railway or any portion thereof.

Glastonbury Gas-Works Purchase.—The Glastonbury Town Council last Tuesday adopted the report of a Committee recommending the purchase of the gas-works; and the Mayor was requested to call the necessary statutory meeting.

ELECTRIC LIGHTING NOTES.

The Colchester Town Council have received the sanction of the Local Government Board to the borrowing of a further £6500 for purposes of electric lighting.

The Electric Lighting Committee of the York City Council report that they hope to be in a position to supply electric current about the end of November.

Redruth, which is so closely associated with the invention of gas lighting, is to adopt the electric light. The District Council decided yesterday week to engage the services of Mr. W. H. Trentham to advise them in the matter.

An interesting reply was given to a question at the meeting of the Lincoln City Council last Tuesday by Alderman E. Pratt. He stated that there was no intention to extend the electric lighting of the streets at present; and he quite believed the time would come when they would return to gas for street illumination.

The ceremony of laying the foundation-stone of the Corporation electricity works at Grimsby was performed last Thursday afternoon by Alderman G. S. Dobson, the Chairman of the Electric Lighting Committee. The estimated cost of the whole undertaking is £43,500; but it is expected that this amount will be somewhat exceeded before the work is complete.

The members of the Bridlington District Council appear a little too sanguine on the subject of the electric light. They are unanimously of opinion that they will be able to supply electricity at a price cheaper than they are now paying for gas; and, this being so, they have resolved to take the necessary steps for obtaining a Provisional Order. The price of gas, we believe, is just under 3s. per 1000 cubic feet; and the cost of the public lighting is between £1100 and £1200 a year.

By means of a temporary installation of electric lighting, the Wigan Town Council are hoping to foster a connection for any future scheme they may take in hand in this direction. A threat by a firm to put down a plant for the supply of themselves and their neighbours if the Corporation did not furnish them with current, led to this temporary arrangement, which has cost something like £1000. Naturally some of the ratepayers object to the expenditure of such a sum to meet an individual demand.

At the meeting of the Court of Common Council of the City of London last Thursday, a letter was submitted from the Board of Trade, intimating that they had given their approval to the additional system of supply by continuous electric current proposed to be provided by the City of London Electric Lighting Company. Relative to an application by that Company for permission to alter the standard pressure of supply to consumers from 100 to 200 volts, the Streets Committee recommended that it should be complied with, subject to the Company agreeing (1) to make at their own expense the necessary alterations to consumers' lamps, wires, or fittings directly or indirectly incidental to that change; (2) that the prices of supply should at no time be raised above those contained in the Company's notice of the 26th of July; and (3) to establish, concurrently with the alteration of the pressure, proper means of testing the public and private supply. The recommendation was agreed to.

Mr. H. Percy Boulnois, one of the Local Government Board Inspectors, attended at Taibach last Thursday to inquire into an application by the Margam District Council for power to borrow £6500 for the purpose of laying down an electric light plant. Since the application was first made, the scheme has been extended; and the total cost will now amount to £7000. It is estimated that the working expenditure will be £1095; but the revenue from the private consumers, as ascertained by a canvass, is only likely to be £663. The Aberavon Corporation, who are the lighting authority for the district, were represented; and it was stated that they were ready and willing to supply gas to the Margam authority at the rate of 3s. 2d. per 1000 cubic feet in the compulsory area of the electric light scheme, which would be far cheaper than electricity. It also transpired that the Corporation, through the overtures of the Margam people, had gone to the expense of providing new mains in the district and erecting a new holder, at a cost of something like £9000. Mr. Boulnois made an inspection of the locality at the conclusion of the evidence.

The Finance and General Purposes Committee of the Lewes Corporation, who were instructed last June to negotiate terms for an agreement with some company for the transfer to them of the Council's Electric Lighting Order, have reported on the subject. In response to the Committee's advertisement, four tenders were sent in; and that of the Electrical Power Distribution Company is recommended. The Company propose to charge on the Brighton system—7d. per unit up to the equivalent of the first 100 hours, and 2½d. per unit afterwards. For street lighting, the charge will be 7d. per unit up to 400 hours, and 2½d. per unit afterwards. The Company purpose spending £20,000 on the undertaking to begin with. The plant will be capable of dealing with a maximum load of 250 to 300 kilowatts when all the dynamos are running at their full rated power, but excluding the capacity of the accumulators; and the supply will be on the low-pressure continuous-current system. The Corporation will have the power of buying back the undertaking after 12, 19, 26, or 33 years from the time the Company commence the supply, on giving two months' notice of their intention so to do. After the expiration of 42 years, the Corporation are to be at liberty to purchase on the terms set forth in section 2 of the Electric Lighting Act, 1888. The Company will repay the costs of obtaining the Order, which have already been paid by the Council, and also all further costs incurred up to and including the transfer. It is estimated that the total amount of all these costs will be about £550. The report came before the Council at their meeting on Wednesday evening, and was adopted.

Dartmouth has not maintained the heroic attitude which it assumed towards the Company who are anxious to introduce it to the advantages of electric lighting. This Company (Edmundson's Electricity Corporation) wrote that they were "amazed" at the "absurd" suggestion that they should consent to part with the undertaking at the end of fourteen years at a break-up value. "It would not be likely," they added, "that in a town of the size of Dartmouth the Electric Light Company would pay a dividend for the first two years; and the average dividends paid on the fourteen years would not amount to more than 5 per cent." In another instructive sentence they explained that if it were not for the extended area of their work, and the number of Provisional Orders they were engaged carrying out, they would not dream of attempting to introduce the electric light into a town of the size of Dartmouth, "as, perhaps with one exception, in no such sized place has an electricity works been established successfully." This may be commended to the notice of the authorities in some of the small towns, who are ambitiously entering upon electric lighting schemes of which they are far from seeing the end. The Town Council of Dartmouth, in a chastened spirit, agreed to consent to the Company's terms, providing they are given the option of purchasing the undertaking at the end of fourteen years as a going concern.

A curious revelation of municipal methods took place at a Local Government Board inquiry lately held by Major-General Crozier at Torquay. It was with respect to an application for power to borrow £10,000 for extension of the Corporation's electric lighting plant. The Town Clerk explained that the original estimate of the cost of the works was £22,300; but the expenditure was £24,959—an excess of £2659. By far the larger part of this was due to the change of position of the boilers, &c., at the generating station, in order to prevent the possibility of interfering with the Bath Saloons; but this extra cost was more than compensated for by the capacity for extension at any future time. On the first year's working, the deficit, after making provision for interest and sinking fund, was only £130. The progress of the undertaking had been continuous; and the additional capital now required comprised £3544 for new mains and services, £200 for tools and instruments, £500 for rectifiers, £2300 for meters, transformers, and sub-stations, £800 for public lamps, and £2659 the excess expenditure over the estimate on the original installation. Mr. P. Storey, the Electrical Engineer, was called in support of the application, and was at once asked by the Inspector to produce the original plans of the works. Mr. Storey had not them, nor had the Town Clerk; and it was said that they were in the possession of the consulting engineer, Mr. Trentham. The Inspector said an alteration had been made which was not sanctioned by the Local Government Board; and he wanted the plans to understand how the excess of expenditure over the estimates took place. Some rough plans were produced, and General Crozier inquired concerning the details of the £2959 spent on the works in excess of the estimate. The Mayor (Mr. W. Beavis) explained that £150 was spent in excavating under the Baths Saloons for the boilers, which were afterwards placed elsewhere; and the Town Clerk added that the cost of altering the engines and boilers for the new site was £1100. The Inspector expressed great dissatisfaction with the inadequacy of the explanation. The loss at the central station had been immense. He did not know what view the Board would take of the matter. The change of plans in the middle of the work was not reported to them. By their instability of purpose, the Corporation lost so much money; and now they did not show what it was. All that was told to him did not amount to anything like the £2700 which, on the lowest estimate, seemed to have been lost. The Town Clerk said that while the works were in progress they were threatened with an injunction. The Corporation feared the Bath Saloons would be seriously affected if the boilers were placed under them, as originally proposed. The Inspector replied that he was not complaining of the alterations made; but it ought to have been thought of before the work was commenced. What he wanted was the actual sum lost on the abandoned work. On one item there was £1100, and on the boilers £1547 to be accounted for; and no explanation was given of how the money was spent. Then on the chimney and flue there was £1468 to be accounted for. The total was £4149. The Town Clerk said that on the other side there was a saving of £1200 on contingencies. The rest was due to the alterations; and the change of site was by direction of the Committee and not of Mr. Trentham, who did not think it necessary. Alderman Kerswell, Chairman of the Electric Light Committee, also explained that Mr. Trentham was not to blame; while the Mayor, who led the opposition offered by a section of the ratepayers to the original selection of the Baths Saloon site, expressed the opinion that the Council acted on the safe side in making the change. Proceeding with the inquiry as to the proposed new works, the Inspector ascertained that two new rectifiers are to be provided, as the existing ones will not be sufficient for the increased demand for light. The Inspector said this was not business. They could have provided larger rectifiers in the first instance. This would mean the wholesale sacrifice of the old rectifiers. The Mayor answered that they could not anticipate the demand which had arisen. Mr. H. Bedford, a ratepayer, opposed the application, on the grounds that the Corporation did not seem to know what they were doing, and knew nothing of electricity. The latter, remarked the Mayor, was an objection which applied to all corporations. An attempt, which did not meet with much success, was made at the meeting of the Town Council last Tuesday to obtain some information on the subjects inquired into by the Local Government Board Inspector. One member thought questions should be put in Committee instead of in public. If this were done, he said, they would not get half the bad reports about the work of the Council. Alderman Kerswill, the Chairman of the Electric Lighting Committee, suggested that all the trouble arose through a misunderstanding on the part of the Inspector. He wanted a plan which they had not got; but he would have found all the information he wished in the report of the Consulting Engineer, which he probably had before him. Mr. R. Crocker thought the Committee might have avoided the exhibition which they made, and upon which there had been considerable comment in the town and neighbourhood. The Mayor cut short any further criticism by declaring that it would be inconvenient to debate the question until the Inspector had reported. By that time—if the Local Government Board proceed in their usual leisurely fashion—the incident will, no doubt, be generally forgotten. In the meantime, Mr. Trentham has communicated to the local papers some particulars which show what became of the money spent in excess of the estimate. The contract price for the works was £20,443 11s. 6d., and the total expenditure £24,959 6s. Some portion of the £4500 went in extras ordered by the Electric Lighting Committee, or "ordinary extras;" and there was £946 for house connections and meters, and £887 for spare materials, such as cables and troughing, which are now being used for extensions. The important point is that the total cost of the change of site was only £1253, and Mr. Trentham claims that the whole of this, with the exception of £164 spent on the first site before it was abandoned, would have been necessarily spent had the second site been chosen in the first instance. He asserts, however, that there is value for the money in the space which the second site affords for extensions.

EAST LONDON WATER-WORKS COMPANY.

The Half-Yearly General Assembly of Proprietors of this Company was held on Thursday last, at the City Offices, St. Helen's Place, E.C.—Colonel Lockwood, M.P., in the chair.

The Secretary (Mr. I. A. Crookenden) having read the notice convening the meeting, the report and accounts for the half year ending the 24th of June were presented. The latter showed an increase of £5262 in the revenue, and of £7807 in the expenditure, as compared with the corresponding period of 1898, exclusive of £4587 of "extraordinary parliamentary expenses" incurred last session. There was a rise of £5476 in the water-rates—from £165,524 to £171,000. In their report the Directors stated that 3977 new services had been laid, against 3074 in the first half of last year; bringing up the total to 201,047. Reference was made to the rejection of the Company's Bill, and to the intention of the Board to re-introduce it next session; also to the satisfactory working of the intercommunication scheme, which had enabled the Directors, with the increased storage granted under the Act of 1894, to keep up a constant supply of water during the drought. They recommended a dividend on the ordinary stock at the rate of 7 per cent. per annum (less income-tax), which would absorb £60,219 of the £72,936 available; leaving a balance of £12,717, against £27,000 this time last year.

The Chairman stated that the Company were told last year, by those who were ready to prophesy, that such a drought as had then been experienced was not likely to occur again, and that the storage capacity which the Company always insisted upon as necessary to tide over exceptional difficulties was an expensive luxury, and not likely to be drawn upon more than once in a decade. The present year's drought, of exceptional severity, proved the futility of such forecasts, and showed that water companies must at all times be prepared for the unexpected. Continuous months of sunshine had, no doubt, proved agreeable and healthful to the population; but to those who had to provide the necessary water supply for over 1,334,000 people, these months had proved trying in the extreme. During June, July, and August of this year there was a rainfall of only 4·2 inches, against an average of 8·8 inches recorded for the last 84 years. The River Thames, however, had not failed them; and the Company's own river—if they might call it so—the Lea, although in its watershed capacity only 10 per cent. that of the Thames, had behaved fairly well through this abnormally dry season. Despite all forebodings, and the presence of tremendous anxiety to all concerned, the Company had been able to keep up a constant and full supply to the whole of the enormous population he had named, and with very few complaints. When he said "despite all forebodings," he thought it right to deprecate, in the strongest possible terms, the continuous false reports published by a section of the Press as to the Company having either cut off the supply of water, or as to their immediate intention to do so. These reports had not the smallest foundation of truth, and were calculated to do the Company infinite harm at a time when the officers and Directors were straining every nerve to prevent such a calamity. It was true that in some cases the wish had been father to the thought. It seemed to be the object of a portion of the Press and of a section of the community to prove that the Company were careless and ignorant of their duties, or incapable of fulfilling them; and such persons would, he believed, prefer the public misfortune of a curtailed supply to seeing the East London Company emerge triumphant from a period of drought. Of course, as the proprietors probably were aware, and as was stated in the Directors' report, the Company had had considerable help from the Thames Companies and the New River Company. The intercommunication scheme was initiated by this Company as long ago as 1896, as a power in reserve; and it was incorporated in their Act of 1897, although vigorously opposed by the London County Council. It had been subsequently developed under the Government Act of the past session, and had been applied with very beneficial results. This, of course, was a matter of expense, and their dividends suffered accordingly; but he was satisfied from the past experience of the stockholders that they would bear the loss ungrudgingly. The paramount consideration of the Company had always been to give a sufficient and, indeed, an abundant supply of pure water; and hence they instituted years ago, and had carried through, the principle of constant service, under the Acts of 1852 and 1871, without the slightest compulsion, or even suggestion, from any of the authorities that this system should be adopted. It had been stated that the Directors had always sacrificed the consumer to the shareholder, and that the interests of the two were incompatible. He hoped that the Board had proved this to be false; and that, while they had spent money lavishly in providing a continuous supply under difficulties, they had proved themselves capable guardians of the pecuniary interests of the shareholders. Following out the traditional policy of the Company, and in the exercise of that prescience which responsible men were wont to observe, the Directors had, as the shareholders knew, from time to time introduced Bills into Parliament for the necessary extensions of plant, works, machinery, and mains, as well as additional capital, in order to meet the growing demands, which had increased from year to year in the past, and which were at the moment increasing at a greater rate than ever. The rejection of the Company's Bill of 1893, owing to the active and successful opposition of the London County Council, was an old story, but one which they ought never to lose sight of. The loss of that measure was the cause of the partial reversion to intermittent supply in 1895 and 1896. Again, as the shareholders might remember, the Company's Bill of 1894 was only obtained by a majority of 1 vote. Had that measure been similarly rejected, they would have had 600 million gallons of water less to distribute to the population of East London than they had at the present moment; and with so diminished a reserve, it would probably have been necessary partially to shut down during the present season. It was quite true that these were all things of the past; but they were points of experience, and experience to a water company meant provision against similar crises. Hence it was that the Directors were grieved and disappointed at the rejection by a Committee of the House of Lords during last session of the Company's Bill for further extension of their reservoir capacity. The decision caused universal surprise; and the Board unanimously agreed to his publishing a letter in the Press (it appeared on June 29) setting forth the circumstances. To refuse to give the Company the means which, in their judgment, were necessary to meet the future requirements of the district, absolved them, it was true, from all moral responsibility; but upon whose shoulders now rested the obligation

GAS AND WATER COMPANIES' STOCK AND SHARE LIST.

Referred to on p. 872.

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p. c.	GAS COMPANIES.			£ s. d.
590,000	10	Apl. 13	10½	Alliance & Dublin 10 p. c.	22—23	..	4 11 4
100,000	10	,,	7½	Do. 7 p. c.	15½—16½	..	4 10 11
800,000	100	July 3	5	Australian 5 p. c. Deb. .	102—104	..	4 16 2
200,000	5	May 12	6	Bombay, Ltd.	6—6⅛	..	4 12 3
40,000	5	,,	6	Do. New, £4 paid .	4¼—4¾	..	5 1 1
880,000	Stk.	Aug. 16	12	Brentford Consolidated	277—282	..	4 5 1
270,000	,,	,,	9	Do. New . . .	210—215	..	4 3 9
50,000	,,	,,	5	Do. 5 p. c. Pref. .	140—145	..	3 9 0
159,375	,,	June 15	4	Do. 4 p. c. Deb.. .	126—130	..	3 1 7
220,000	Stk.	Sept. 15	11½	Brighton & Hove Orig. .	255—265	..	4 6 9
226,320	,,	,,	8½	Do. A. Ord. Stk. .	190—195	..	4 7 2
973,500	Stk.	Aug. 16	5	Bristol, 5 p. c. max. .	125—130	..	3 16 11
420,000	20	Sept. 29	10	British	43—45*	..	4 8 11
50,000	10	Aug. 31	12	Bromley, Ord. 10 p. c. .	24—26	..	4 5 8
75,000	10	,,	9	Do. 7 p. c. . . .	19—21	..	4 5 8
500,000	10	Apl. 27	6	Buenos Ayres (New) Ltd.	9¾—10¼	..	5 17 1
220,000	Stk.	June 29	4	Do. 4 p. c. Deb. .	100—102	..	3 16 5
150,000	20	July 13	8½	Cagliari, Ltd.	28—29	..	5 18 10
100,000	10	Sept. 29	8	Cape Town & Dis., Ltd.	13¾—14½	..	5 10 4
50,000	50	May 2	6	Do. 6 p.c. 1st Mort.	57—59	..	5 1 8
650,000	Stk.	Apl. 13	13½	Commercial Old Stock .	316—321	..	4 4 1
200,750	,,	,,	10½	Do. New do. .	245—250	..	4 4 0
200,750	,,	June 15	4½	Do. 4½ p. c. Deb. .	143—148	..	3 0 10
600,000	Stk.	June 15	10	Continental Union, Ltd.	185—187	..	5 7 0
200,000	,,	,,	7	Do. 7 p. c. Pref. .	182—187	..	3 14 10
51,600	Stk.	Aug. 31	14	Croydon A 10 p. c. . .	335—340	..	4 2 4
168,400	,,	,,	11	Do. B 7 p. c. . .	265—270	..	4 1 5
555,000	Stk.	Aug. 16	5½	Crystal Palace Ord. 5 p. c.	132—137	..	3 16 8
60,000	,,	,,	5	Do. 5 p. c. Pref. .	140—145	..	3 9 0
466,620	10	July 28	11	European, Ltd. . . .	21½—22½	–½	4 17 9
854,060	10	,,	11	Do. £7 10s. paid .	15½—16½	–¾	5 0 0
14,993,075	Stk.	Aug. 16	4⅝	Gas- 4 p. c. Ord. . .	103—105	..	4 13 4
2,600,000	,,	,,	3⅝	light 3½ p. c. max. .	97—99	–¼	3 10 8
3,799,735	,,	,,	4	and 4 p. c. Con. Pref.	120—123	–1½	3 5 1
3,993,975	,,	June 15	3	Coke 3 p. c. Con. Deb.	99—101	–1	2 19 5
70,000	10	May 31	8	Hongkong & China, Ltd.	13¾—14½	..	5 10 4
3,800,000	Stk.	May 12	10	Imperial Continental .	220—225	–2	4 8 11
473,600	Stk.	Aug. 16	3½	Do. 3½ p. c. Deb. Red,	101—104	..	3 7 4
75,000	5	June 15	6	Malta & Medn., Ltd, .	5—5½	..	5 9 1
560,000	100	Oct. 2	5	Met. of 5 p. c. Deb.	110—114*	+1½	4 7 9
250,000	100	,,	4½	Melbourne 4½ p. c. Deb.	108—110*	..	4 1 10
541,920	20	May 31	5	Monte Video, Ltd. . .	12¾—13½	..	7 8 1
617,946	Stk.	Aug. 31	9½	Newc'tle & Gatesh'd Con.	235—240	..	4 0 5
264,855	Stk.	June 29	8½	Do. 3½ p. c. Deb. .	106—109	..	3 4 3
				* Ex div.			

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p. c.	GAS COMPANIES.			£ s. d.
150,000	5	May 31	8	Oriental, Ltd. . . .	7¼—8	..	5 0 0
135,000	5	,,	8	Do. New, £4 10s. pd.	6¾—7	..	5 14 3
15,000	5	,,	8	Do. do. 1879, £1 pd.	1¾—2	..	4 11 5
60,000	5	Sept. 29	7	Ottoman, Ltd. . . .	5¼—5¾*	..	6 1 9
500,000	100	June 1	6	People's Gas 2nd Mtg. of Chicago Bonds .	103—106	..	5 13 2
851,070	10	Apl. 27	7	River Plate Ord. . . .	11—11½	–¼	6 1 9
250,000	Stk.	June 29	4	Do. 4 p. c. Deb. .	100—102	..	3 18 5
250,000	10	Sept. 15	10	San Paulo, Ltd. . . .	14—15	–½	6 13 4
136,000	Stk.	Sept. 15	10	Sheffield A.	247—245	..	4 0 4
209,053	,,	,,	10	Do. B.	247—249	..	4 0 4
447,427	,,	,,	10	Do. C.	247—249	..	4 0 4
5,600,000	Stk.	Aug. 16	5½	South Metrop., 4 p.c. Ord.	137—140	–3	3 16 1
1,520,000	,,	July 13	8	Do. 3 p. c. Deb. . . .	101—103	..	2 18 3
120,000	Stk.	Aug. 31	6	Tottenham A. 5 p.c. and B. 2½ p.c.	141—143	..	4 3 11
250,530	,,	,,	4½		102—104	..	4 6 6
55,100	,,	—	4	Edmonton 4 p.c. Deb.	115—120	..	3 6 8
182,880	10	June 15	5	Tuscan, Ltd.	9—10	..	5 0 0
149,900	10	July 3	5	Do. 5 p. c. Deb. Red.	98—100	..	5 0 0
				WATER COMPANIES.			
746,184	Stk.	June 29	11	Chelsea, Ord.	313—318	..	3 9 2
150,000	,,	,,	5	Do. 5 p. c. Pref. .	168—168	–3	2 19 6
160,000	,,	,,	4½	Do. 4½ p. c. Pref. '75	145—150	–3	3 0 0
175,785	,,	Sept. 29	4½	Do. 4½ p. c. Deb. .	150—155*	–3	2 18 1
1,720,560	Stk.	Apl. 13	7	East London, Ord. . .	207—212	..	3 6 0
654,740	,,	June 29	4½	Do. 4½ p. c. Deb. .	152—157	–2	2 17 4
390,000	,,	,,	3	Do. 3 p. c. Deb. .	101—103	..	2 18 3
700,000	50	June 15	7½	Grand 10 p. c. max. .	109—112	–3	3 7 0
310,000	Stk.	Sept. 29	4	Junction 4 p. c. Deb. .	133—138*	..	2 18 0
708,000	Stk.	Aug. 16	14	Kent	357—362	–1	3 17 4
160,000	,,	,,	7	Do. New, 7 p. c. max. .	208—213	..	3 5 9
1,043,800	100	June 29	10½	Lambeth, 10 p. c. max. .	300—305	+2	3 8 10
406,200	100	,,	8	Do. 7½ p. c. max. .	235—230	..	3 9 7
350,000	Stk.	Sept. 29	4	Do. 4 p. c. Deb. .	136—140*	..	2 17 2
500,000	100	Aug. 16	13½	New River, New Shares	430—440	..	3 1 4
1,000,000	Stk.	July 28	4	Do. 4 p. c. Deb. .	135—140	..	2 17 2
902,300	Stk.	June 15	7½	South- Ord. . . .	205—210	..	3 11 5
126,500	100	,,	7½	wark 7½ p. c. max. .	193—198	..	3 15 9
489,200	Stk.	,,	5	and 5 p. c. Pref.	165—170	–2	2 18 10
1,019,585	,,	Apl. 13	4	Vauxhall 4 p. c. A Deb.	133—138	–2	2 18 0
1,155,066	Stk.	June 15	10	West Middlesex . . .	300—305	..	3 5 7
200,000	,,	,,	4½	Do. 4½ p. c. Deb. .	152—157	–1½	2 17 4
200,000	,,	Sept. 15	8	Do. 3 p. c. Deb. .	101—103	..	2 18 3
				* Ex. div.			

of providing the ever-increasing population of East London with one of the first essentials of life—pure water? That was the *crux* of the whole question, and with respect to which judgment must be passed in the future. Despite this rebuff, however, the Directors had resolved to re-introduce the Bill next session; and it was gratifying to announce that the step had received, and would continue to receive, unequivocal support from the highest authority upon the subject in the realm. Most of the proprietors had probably seen the correspondence which had passed between the London County Council and the Local Government Board (the Department of State responsible for the water supply of the Metropolis), in which it was made clear that the Company's attempt at legislation was justifiable and approved. Copies of this correspondence could be obtained by any proprietor who might not have seen it and would like to have it. As stated in the Directors' report, the final report of the Royal Commission was still *sub judice*. What its terms or its effect upon the water interest might be, it was impossible to foretell; but whatever the views of the Commission might be with respect to the Welsh or any scheme of sources of supply, it was perfectly clear that the present sources must not only be utilized for the next fifteen years, during the construction of the necessary outlying works and conduits, but that they must be kept and used in perpetuity—this necessity being frankly admitted by the officers of the London County Council themselves. The proprietors would therefore not be surprised to hear that he did not intend to sell any of the water stock that he possessed beyond his qualification. Referring to the accounts, the shareholders would observe that the increase of water-rates amounted in the half year to £5476. This was nearly £1500 more than the average increase in the Midsummer half year for the last ten years. With regard to the new services laid on, he was happy to state that the class of houses was slightly improving in value; the new houses laid on in the half year averaging £1 4s. 4¾d. for water-rate per house, against £1 3s. 8d. for the corresponding period of 1898. The trade meters were also well kept up. The number of new services laid on was 3977, as against 3074 for last year, and the number of new meter services was 242. On the other side of the account, he regretted to say that there was a large increase in the item of maintenance. Materials and coals had gone up in price from a variety of causes. The cost of labour had also increased; and, as far as the Board could judge, this increase was likely to continue. He, however, speaking from purely personal observation, did not find that the quality or quantity of the work increased in the same proportion as the wages. He could confidently state that every economy was carefully observed by the Directors and the officers; and it was with a certain degree of pride that he told the proprietors that the percentage of maintenance to the quantity of water pumped was lower in the case of the East London Company than that of any other Metropolitan Water Company, with one exception. The Board recommended the same dividend as before—namely, at the rate of 7 per cent. per annum for the half year—carrying forward a balance of £12,717. They thought this fairly satisfactory, having regard to the fact that the extraordinary expenses caused by the loss of the Company's Bill and the sums paid on account of the Royal Commission, amounting together to £4587, had all been charged to the revenue for this half year. These expenses were rather hard upon them; but they had had to be met, and had been disposed of accordingly. During the last half year the following works had been in progress: The new 36-inch main from Camden Town to Shoreditch had been completed, and was in use. A new 30-inch main had been laid from Shoreditch to Whitechapel. A new 30-inch main had been substituted for a 20-inch main from the Tower Subway to Leman Street; and a new 20-inch main had been laid from Leman Street to Limehouse. A new engine-house had been erected at Ponder's End, with boilers and installation complete. A new engine-house had been built at Ferry Lane, and triple expansion engines had been erected and got to work. A new engine-house had been erected at Lea Bridge, also with a triple expansion engine; and this was at work. The contract for the Company's new reservoirs under the Act of 1897 had been let, under open competition, to Messrs. W. Pearson and Sons; and the works were in active progress, and had been several times visited by the Directors. He concluded by moving a resolution for the adoption of the report and accounts and the payment of a dividend at the rate of 7 per cent. per annum (less income-tax) on the ordinary stock for the half year ended Midsummer last.

Sir H. Barnard seconded the resolution, which was carried unanimously.

On the motion of Mr. F. Tendron, seconded by Mr. W. S. Cuff, a resolution was afterwards passed appointing Mr. Daniel Hill an Auditor in the place of the late Mr. George Ilsley.

Mr. Tendron then proposed a vote of thanks to the Chairman, the Directors, and the staff. The Chairman's speech had been so comprehensive that, tempted as he (the speaker) always was to enter upon the water question, he would abstain from doing so on this occasion. He thanked the Chairman and the Directors for the admirable services they had rendered to the Company, and he had been very glad to hear that they had not been in the least disheartened by the loss of their Bill last session. To the shareholders the delay thus caused was the saving of a year's interest; while to the public, he hoped that it would not be an inconvenience. He had not the least doubt that the Company would next session pass their Bill through the House of Commons; but if there was a Committee of the House of Lords, he trusted that the members who formed it would have some comprehension of the subject before them. With regard to the officers, the proprietors knew how indefatigably Mr. Bryan, Mr. Crookenden, and the whole staff worked to promote the welfare of the Company.

Mr. Ilsley seconded the motion, which was carried unanimously.

The Chairman, in acknowledging the vote, stated that the past summer was a period of the greatest anxiety to all concerned in the management of the Company. The public would never know as well as he did the deep debt of gratitude that was due to the officers. The Company, however, had passed through this anxious period successfully, and without causing inconvenience to the public.

The proceedings then terminated.

CARBURETTED WATER-GAS APPARATUS

Merrifield—Westcott—Pearson Patents.

The Economical Gas Apparatus Construction Co., Ld.

W. H. PEARSON, Chairman.
W. H. PEARSON, Junr., Deputy-Chairman.
J. T. WESTCOTT, M.E., Manager.
L. L. MERRIFIELD, M.Inst.M.E., Engineer.

London Offices: 19, ABINGDON STREET, WESTMINSTER, S.W.
American Offices: TORONTO. Telegraphic Address: "CARBURETED, LONDON."

CARBURETTED WATER-GAS ENGINEERS.

The above Company have erected since 1893, or are now erecting, their Universal Type of Carburetted Water-Gas Plant at the following Gas-Works:—

	Cubic Feet Daily.		Cubic Feet Daily.
BLACKBURN	1,250,000	BRANTFORD (Remodelled)	200,000
WINDSOR STREET WORKS, BIRMINGHAM	2,000,000	ST. CATHERINES (Remodelled)	250,000
SALTLEY WORKS, BIRMINGHAM	2,000,000	KINGSTON, PA.	125,000
COLCHESTER	300,000	PETERBOROUGH, ONT.	250,000
BIRKENHEAD	2,250,000	WILKESBARRE, PA.	750,000
SWINDON (New Swindon Gas Co.)	120,000	ST. CATHERINES (Second Contract)	250,000
SALTLEY WORKS, BIRMINGHAM (Second Contract)	2,000,000	BUFFALO, N.Y.	2,000,000
WINDSOR STREET WORKS, BIRMINGHAM (Second Contract)	2,000,000	WINNIPEG, MAN.	500,000
HALIFAX	1,000,000	COLCHESTER (Second Contract)	300,000
TORONTO	250,000	YORK	750,000
OTTAWA	250,000	ROCHESTER	500,000
LINDSAY (Remodelled)	125,000	KINGSTON, ONT.,	300,000
MONTREAL	500,000	CRYSTAL PALACE DISTRICT	2,000,000
TORONTO (Second Contract; Remodelled)	2,000,000	DULUTH, MINN.	300,000
BELLEVILLE	250,000	CATERHAM	150,000
OTTAWA (Second Contract)	250,000	LEICESTER	2,000,000
		ENSCHEDE (HOLLAND)	150,000
		BUENOS AYRES (RIVER PLATE CO.)	700,000

And Additional Work, including complete Gas-Works at Nelson and Rossland, British Columbia.

FALMOUTH CORPORATION AND THE WATER-WORKS.

Resolution in Favour of Purchase.

The Falmouth Corporation met last Wednesday evening to further consider the question of the water supply. The Mayor (Mr. J. Grose) presided. Mr. T. J. Thuell moved a resolution, of which he had given notice, which asserted that the Falmouth Water Company had failed to carry out their obligations, with results which were detrimental to the interest and prosperity of the town, and that steps should therefore be taken to purchase the undertaking. Futile attempts had, he said, been made to municipalize the water and gas works. Members of the Corporation were divided in opinion in reference to the purchase of the gas-works; but with regard to the water supply, it was patent that they could no longer tolerate a condition of things which existed merely for the benefit of a Company with a London directorate. They believed the water was neither pure nor wholesome; and the fear of contamination kept visitors away from the town. The Corporation had suggested remedial measures which the Company had not carried out. They were assured that the sources were good, and that there was nothing to prevent Falmouth having, in capable hands, a plentiful supply of pure water. Dr. Banks said he did not believe the Company had the power to do all that the Corporation had been expecting them to do; and yet the Corporation could be satisfied with nothing less than they had suggested. The only alternative was to bring the works under public control. It was a serious matter, for if the Corporation acquired the works they would have to put down filter-beds, enlarge the higher reservoir, deepen the storage pool, probably build a water-tower to get pressure at the higher levels, renew a large part of the mains, and get control over the watershed. These things meant the expenditure of an enormous sum. He should, however, support the proposal to purchase the water-works, as he had always done. He did not agree with the threatening character of the motion; and therefore he moved, as an amendment—"That this Council re-affirms its belief that, for sanitary and other reasons, the water supply of the borough should be under the complete control of a public body, and to this end directs the Town Clerk to write to the Secretary of the Falmouth Water-Works Company to ascertain if the Directors of that Company are willing to enter into negotiations for the sale of their concern to the Falmouth Town Council, separately or in conjunction with the Penryn Town Council; and, in case of the reply being favourable, to ask if the Directors will be prepared to name a price or to agree to submit the valuation to arbitration." Mr. T. G. Mead seconded the amendment; and Mr. F. J. Bowles, who had formally seconded Mr. Thuell's motion, withdrew his support, and said he fully agreed with the amendment. Mr. T. B. Rundell said that Mr. Cox, the Manager of the water-works, had expressed a wish to meet a Committee of the Corporation, and discuss the matter in an amicable spirit. The amendment was carried by seven votes to one; three members declining to vote. The vote against the resolution was that of the Mayor, who said that unless they dealt with the question at once there would be a greater scare next year.

NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

The construction of the new works at Granton for the Edinburgh and Leith Gas Commission is to be begun forthwith. The laying of the foundation stone of the retort-house is to take place on Monday, the 16th inst. It will not be a Masonic ceremony; for the person who has been selected to perform it is the wife of Lord Provost Mitchell Thomson, of Edinburgh. The first section of the works to be dealt with is to be of a capacity of 6 million cubic feet a day. It is expected that it will take about two years to complete.

For some time past there was felt by the Glasgow Gas Committee a sense of dissatisfaction with the Barrowfield Iron-Works Company on account of the slow progress they were making with the new gas-holder at the Temple Gas-Works. A Sub-Committee had an interview with Mr. R. Laidlaw on the subject, with the result that he undertook to make every effort to complete the work with the least possible delay, and expressed his belief that the Company would be able to have the holder finished by the end of the present month. There are now about 16,000 gas-stoves and kitchen-range fittings on hire in the Glasgow gas-supply district; and there are sold, in the shape of stoves, range-fittings, fires, burners, and other heating appliances, about 24,400. Of course, Glasgow covers a very wide area; the nearest gas-works out of the city being those of Cambuslang, Renfrew, and Paisley.

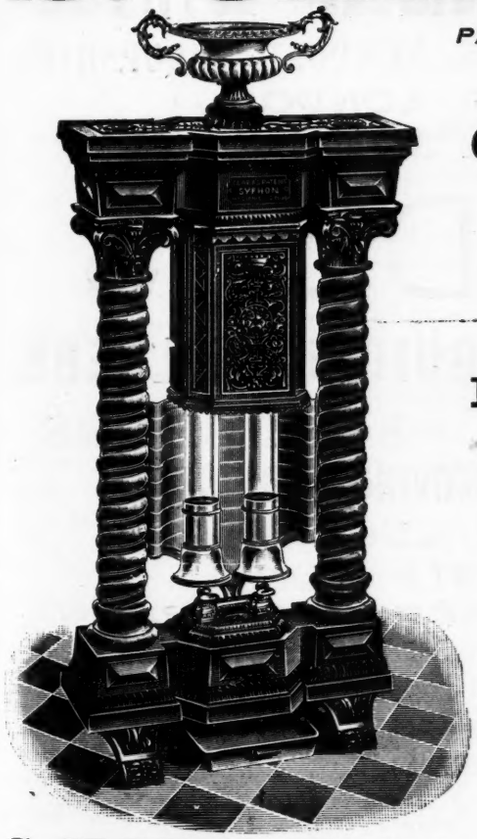
Messrs. R. & J. Dempster, of Newton Heath, Manchester, are a firm of great activity. They have purchased the Langloan Iron-Works at Coatbridge, formerly the property of Messrs. Robert Addie and Sons, and are about to re-start them. The works have been closed for a number of years. It is anticipated that the new owners will be able to place pig-iron on the market in less than twelve months from now. Messrs. Dempster intend to put down plant for the recovery from the gases of sulphate of ammonia and other bye-products. They have already large sulphate works at the Shotts and Carnbrae Iron-Works in Scotland.

To show that the chemical trade in Scotland is in a flourishing condition, I may mention that Mr. A. Gillespie, of Glasgow, is at present superintending the erection of plant for the recovery of bye-products from blast-furnace gases at the Summerlee Iron-Works, Coatbridge, similar to those put up by him at Kilwinning, Wishaw, and other places. He is also busy with the erection of a series of coke ovens, on the Semet-Solvay system, for Messrs. W. Baird and Co., at Kilsyth.

The net profit earned by the Kilwinning Gas Company during the past year amounted to £221. It has been resolved to pay a dividend at the rate of 5 per cent., absorbing £128, and to carry forward £93. The price of gas has also been reduced from 3s. 11½d. to 3s. 9d. per 1000 cubic feet.

The accounts of the Glenboig Union Fire-Clay Company, Limited, for the year ending Aug. 31 last, after providing for maintenance of works and all current charges, including £711 brought forward from the previous year, show, subject to a completed audit, a gross balance of

S. CLARK & CO.,



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WRITE FOR NEW SEASON'S CATALOGUE.

S. CLARK & CO., Syphon Works, PARK ST., ISLINGTON, LONDON, N.

profit amounting to £24,668. The Directors have resolved to recommend that £5000 be set apart for depreciation on capital expenditure; that a dividend at the rate of 10 per cent. be paid, absorbing £13,500; that £5000 be added to the reserve fund; and that the balance of £1168 be carried forward.

CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *Oct.* 7.

Sulphate of Ammonia.—The market is still on the decline; and the closing quotations are £11 6s. 3d. to £11 10s. per ton, delivered f.o.b. at the ports. Production is increasing; and the determination to move it as it becomes available has necessitated the acceptance of lower prices—Continental demand having all along been very sluggish. In the forward position, prompt prices would be accepted; but buyers will only operate at a discount.

Nitrate of Soda is steady at 7s. 7½d. per cwt. for good, and 7s. 9d. per cwt. for refined quality.

LONDON, *Oct.* 6.

Tar Products.—Production has now become practically normal; and there is no shortness of supplies in any direction. Expressions of surprise are made that, notwithstanding the large reduction in the output of anthracene, this article has not more rapidly assumed higher values. Stocks are reduced and reducing in all directions; and it may soon be that no stock will be found to be in existence. The alizarine trade is good; and makers should be doing well at present prices of anthracene. The same remark applies to the aniline trade, which was never known to be so busy as it is to-day. Its low price has undoubtedly largely extended its use; and to this cause no doubt is attributable the absorption of the greatly increased quantities of benzol which have been thrown on the market during the past year or two. A fair inquiry goes on for naphthas; and crude naphtha is more saleable. Creosote oil is steady, and heavy oils are slightly dearer; while carbolic acid is moving off more freely, and crystals are now more in parity with crude than formerly. A heavy business is noted in pitch; and shipments are taking place on an extensive scale. It is said that fuel makers are short, which has a steadying effect upon the price, although dealers are trying to get in at less money than is quoted below.

Average prices quoted during the week are: Tar, 16s. to 25s. Pitch, east coast 34s. 6d., west coast 33s. 6d. Benzol, 90's 8½d., 50's 10d. Toluol, 1s. 2½d. Solvent naphtha, 1s. 3d., f.o.b. Heavy naphtha, 1s. 2d. Crude, 30 per cent., naphtha, 4½d. Creosote, 3⅜d. Heavy oils, 75s. Carbolic acid, 60's 2s. 1½d., 75's 2s. 8d. Creosote salts, 52s. 6d., c.i.f. Anthracene, nominal, "A" 3½d., "B" 2½d.

Sulphate of Ammonia is dull; and there appears to be no immediate chance of its improvement. "Bear" dealers seem to have possession of the market, and are undoubtedly concealing orders with a view to depress prices. Shipments are large and enlarging. To-day's value may be taken at £11 7s. 6d., less 3½ per cent. at all ports.

COAL TRADE REPORTS.

From Our Own Correspondents.

Lancashire Coal Trade.—Since the commencement of the month, there has necessarily been a slackening off in the pressure of orders that were previously coming forward; but collieries have had quite as much as they could do to clear off arrears of deliveries on account of orders already booked, while in addition there has been a steady weight of new business also coming forward. Not only have pits been kept running full time, but the output has been inadequate to meet requirements, with the result that stocks are still being filled up. Under these conditions, there has been no difficulty whatever in maintaining the full advance of 10d. to 1s. on round coal, and 5d. to 6d. on engine fuel, which has been backed up by similar advances in all the surrounding mining districts—such as Yorkshire, Derbyshire, and Staffordshire, which are the chief competitors in this market. All descriptions of round coal are in active request; and notwithstanding the increased quantity of house-fire qualities that has been screened lately, supplies of engine fuel continue so short that collieries are not at all disposed to contract forward even at the present advanced rates. At the pit, prices are very firm at 12s. 6d. to 13s. 6d. per ton for best Wigan Arley, 10s. 6d. to 11s. 6d. for Pemberton four-feet and seconds Arley, 10s. for common house-fire coals, 9s. 6d. to 10s. for steam and forge qualities, 7s. to 7s. 6d. for best slack, 6s. 3d. to 6s. 9d. for medium, and 5s. 6d. to 6s. for common sorts. The shipping trade is fairly active; and with many collieries having little or nothing to spare outside their inland trade, supplies are not at all excessive. Prices are strong at 10s. to 10s. 6d. per ton as the minimum for steam coal, and 11s. to 11s. 6d. for house-fire qualities, delivered at the Mersey ports. Coke manufacturers have had under consideration the question of advancing prices; but so far no actual official move has been made, though on some descriptions rates have in isolated cases been put up 1s. per ton. At the ovens, best foundry cokes are very firm at 26s. to 27s. per ton, with common sorts 18s. to 20s. The demand continues in excess of the output.

Northern Coal Trade.—There has been a rather better demand for coal; and this has given a slight stimulus to prices. Best Northumbrian steam coals vary from 10s. 6d. to 10s. 9d. per ton f.o.b. Second-class steam coals are about 10s. 3d., and steam smalls 7s. In manufacturing coals there is a very heavy consumption; but the deliveries are on contracts at rates that are much below those now current. Gas coals are in increasing demand, both locally and for the great consumers in the South; so that the deliveries readily take up the output, though the latter is increasing. The quoted prices of best Durham gas coals vary from about 10s. 6d. to 11s. per ton f.o.b.; but the contracts now in course of arrangement for export next year are believed to range in price from 9s. 6d. to 10s. Gas coke is quoted at from 13s. to 13s. 6d. per ton f.o.b.; but there is rather an increase of the production.

Scotch Coal Trade.—There is no change to record. The demand for the better sorts continues good. For others it is only indifferent. Prices are unaltered. The quotations are: Main 9s. to 9s. 3d. per ton f.o.b.

C. & W. WALKER, LTD.,

MIDLAND IRON-WORKS, DONNINGTON, near NEWPORT, SHROPSHIRE.

110, CANNON STREET, LONDON.

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Carbonic Acid and Tar Extracting Washers.

SULPHATE OF AMMONIA PLANT.

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MAKERS OF WECK'S PATENT CENTRE-VALVE.

TAR-DISTILLING PLANT. CONDENSERS. WOOD SIEVES.

TAR-BURNERS. ROOFS. GIRDERS, &c., &c.

Makers of Cripps' Patent Grid Valve and Hydraulic Main Valve.
Makers of Holgate's Patent Gas-Purifying Plant.
Makers of Tysoe's Patent Self-Sealing Mouthpiece.

Glasgow, ell 9s. 9d. to 10s. 6d., and splint 10s. to 10s. 3d. The shipments for the week amounted to 188,184 tons—an increase of 18,531 tons upon the preceding week, but a decrease of 17,795 tons upon the corresponding week of last year. For the year to date, the total shipments have been 6,639,056 tons—a decrease of 791,135 tons upon the same period of last year.

Darlington Corporation Gas Accounts.—The gas-works accounts for the half year to June 30 were placed before the Darlington Town Council last Thursday. They showed a profit of £2813, of which £1925 had already been placed to the credit of the district fund, leaving a balance of £889.

Electricity for Street Lighting Out of the Question at Birkenhead.—In placing the minutes of the Watch Committee before the Birkenhead Town Council on Wednesday, Mr. Oldham called attention to a report regarding the improvement of the lighting of about 10 miles of streets with incandescent gas-lights at a cost of £1509, which would be repaid in three years, and the lighting would be increased from 150 to 350 per cent. Lighting the town with electricity would, he remarked, be out of the question until it could be obtained at a cheaper rate.

Suggested Purchase of the Dudley Gas-Works.—Without comment, the Mayor of Dudley (Alderman G. H. Dunn) moved, at the meeting of the Council last Tuesday, the adoption of the following resolution of a Special Gas Committee: "That a communication be sent to the Gas Company, asking if they are willing to appoint a valuer to meet one from the Corporation in friendly conference, to see if they could arrive at a sum they could suggest to both sides as a basis for the purchase of the gas undertaking." Mr. Theedum expressed a hope that something practical would result from the action they proposed to take. The resolution was unanimously adopted.

Asphyxiation by Gas.—Last Tuesday afternoon, fifteen girls working at a fancy box manufactory at Ancoats, Manchester, were overpowered by an escape of gas. They were removed to the hospital, where most of them recovered; but a few had to be detained, though there was no reason to fear serious consequences. Plumbers had been at work in the building, and the gas-engine had been receiving attention. The escape of gas seems to have arisen through a valve having been left partly open, and the volume increased when a holder was being charged. It was at this point that the girls were overcome. When the defect was discovered, the gas was shut off and every precaution taken to prevent an explosion or other danger. On Saturday, the 30th ult., a young lady named Alice Mabel Boswell, of Magdalene Street, Norwich, before retiring, went into the library to fetch a book, and in lighting the gas drew down the gaselier. She subsequently turned off the gas, but apparently omitted to push the gaselier back, with the result that the room became gradually filled with gas. Miss Boswell's bedroom was situated immediately above the library; and the next morning she was found unconscious. Medical aid was summoned; but on Monday afternoon the unfortunate young lady succumbed without having regained consciousness.

Theft from a Prepayment Meter.—At the Rotherham Borough Police Court last Thursday, a married woman named Straw was charged with stealing 2s. 10d. from a prepayment meter belonging to the Corporation. One of the meter inspectors deposed that on the 22nd ult. he noticed the indicator recorded a greater volume of gas consumed than was represented by the pence in the box. He spoke to the accused about it, when she commenced crying, and admitted having used a key, which she produced, to open the box. As this was the first offence, a nominal penalty of 5s., including costs, was inflicted.

Cirencester Gas Company, Limited.—At the annual general meeting of this Company on the 30th ult., the Directors reported that the consumption of gas in the year ending June 30 exceeded by 3 million cubic feet that of any preceding year, notwithstanding the mildness of the winter and the long-continued brightness of the summer. There had been a considerable outlay for the extension of mains and services, and for obtaining a further supply of cooking-stoves and prepayment meters, both of which were increasing in popularity. The accounts accompanying the report showed that the revenue for the twelve months was £7903, of which £5619 was for gas supplied for private consumption; while the expenditure was £5716, of which £2984 was for coals. The balance carried to the profit and loss account was £2187; and the sum available for distribution, £2144. The Directors recommended the payment of the statutory dividends of 10, 7, and 5 per cent. on the different classes of shares. This would absorb £883, and leave £1261 to be carried forward. The report was adopted.

The First Public Lighting of Earls Colne, Essex.—Although there has been a Gas Company in existence at Earls Colne, Essex, for the past 34 years, it was not until the 30th ult. that the streets were lighted by gas—not owing to any indifference on the part of the Company, but purely to local circumstances. The parish includes a large portion of agricultural land, and the introduction of the light at public expense has usually met with much opposition; but at a parish meeting held last January, a substantial majority was obtained in favour of the adoption of the Lighting and Watching Act. A poll was, however, demanded by the opponents of the scheme, with the result that the resolution was confirmed by 235 votes to 69. The installation has been arranged by, and carried out under the direction of, Mr. H. Massingham, the Secretary of the Earls Colne Gas Company, Limited. With one or two exceptions, the columns are of the plain fluted type, 9 feet high; and they support new "Ipswich" lanterns fitted with "C" Welsbach burners with bye-pass lever and chains. But, instead of the usual bulb and reflector, "Savoy" chimneys with plain base and ground tops have been used, with very pleasing effect. Owing to the straggling nature of the streets, the lamps are somewhat far apart—the interval ranging from 60 to 100 yards. It may be mentioned, in connection with this installation of public lighting, that considerable alterations have been made at the gas-works, consisting of a new double-lift holder in place of a single-lift one, an additional purifier, and a new gas-engine and exhauster, which have been carried out by Messrs. Cutler and Sons; while the Company's own workmen have replaced about 700 yards of 3-inch main by 6-inch.

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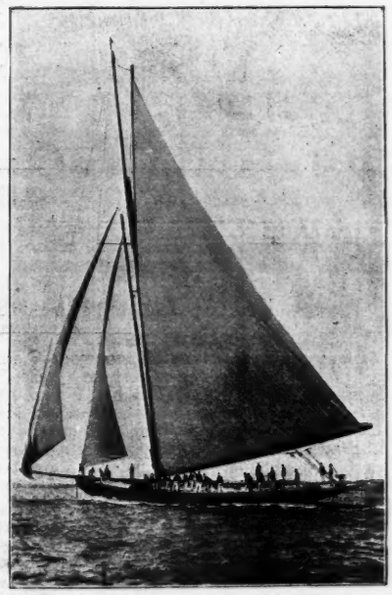

GOOD SAILS / SALES EXPECTED.

Departmental Trading in the Blackpool Town Council.—An animated discussion took place at the Blackpool Town Council last Tuesday on the question of departmental trading. The Gas Department have been in the habit of supplying coke to the Electricity Department; and the latter accuse the former of charging them an unfair price. The consequence is the revenue of one has been increased at the expense of the other. The matter was characterized as departmental jealousy, and was referred to the consideration of the Borough Treasurer.

The Supply of Water Gas by the Liverpool Gaslight Company.—Now that Garston appears to have ceased for the time to harass the Liverpool Gaslight Company on the subject of the supply of water gas, the Waterloo District Council have commenced an attack. They have had an analysis made by Dr. C. A. Kohn of the gas supplied in the district; and this they submitted to the Directors of the Company. In their comments on the report, the Directors say: "The proportion of carbonic oxide, which is shown by the analysis to be contained in the Company's gas (and to which, in the opinion of the recent Departmental Committee, any 'poisonous action of coal gas or water gas is solely due'), is less than the percentage contained in the coal gas supplied in some other towns in Great Britain, and is also below the proportion which it is suggested by that Committee should be allowed. The Directors consider there is no reason for apprehending danger to the health of the inhabitants of the district from the gas supplied by the Company." The reply has been referred to the Health Committee.

The Derbyshire County Council and the Derwent Valley Water Scheme.—At the quarterly meeting of the Derbyshire County Council last Wednesday, the Public Health Committee referred to an interesting and instructive report on the county water supplies prepared by Dr. Barwise and Mr. J. Somer Story, the Medical Officer of Health and the Surveyor to the Council. The Committee said they had had the Derwent Water Act under consideration, and wished to express their appreciation of the advantage the scheme would be to the greater portion of the county. With regard to the price to be paid for the water, considering that none of the capital to be expended upon the work would be provided by the county ratepayers, the Committee were of opinion that by following the well-known precedents of the Manchester and Birmingham Water Acts, the best terms which it was possible to obtain have been made. The price, if the Engineers' estimates proved correct, would be 4½d. per 1000 gallons; while if the works cost a million more than the estimates, it would be 5½d. per 1000 gallons. The scheme will render a supply of the purest water available to the Erewash Valley and the whole of the east side of the county, as well as to the districts in the south of the county in the vicinity of the Leicester line of pipes. It would also enable the Corporation of Derby to afford an ample supply of pure water to those county parishes within the Corporation limits of supply. The storing of the water in the reservoirs during heavy rains must have a material effect in the prevention of floods; and the arrangements which the Joint Board had power to make for telegraphing exceptional rainfall would tend to a similar result. Power has also been given to the County Council to form Joint Water Boards.

The Rainham Water-Works Company, Limited, has been registered, with a capital of £15,000, in £1 shares, to take over the business of the Rainham Water-Works Company, Limited (incorporated in 1881), and to supply water in Rainham and elsewhere in Kent.

Scunthorpe in Darkness.—Scunthorpe was in darkness on the night of last Saturday week, owing to the gasholder becoming jammed. Tradesmen and householders had to resort to paraffin lamps and candles. The occurrence will, no doubt, stimulate the Council to push on with the new works, as, apart from accidents, the old ones are said to be altogether incapable of supplying the needs of the rapidly-increasing town.

Newton-in-Makerfield Water Supply.—The Newton-in-Makerfield District Council have sanctioned a proposal to borrow £17,000 for water-works purposes. A scheme was approved for providing two boreholes, with alternatives for the provision of tanks and duplicates to meet contingencies arising under the first section of the scheme; while the third section provides for reservoirs, &c. The total cost is estimated to be £22,000.

Dungannon Town Commissioners and the Gas-Works.—With reference to the projected purchase of the Dungannon Gas-Works by the Town Commissioners, a letter was read at the meeting of the latter yesterday week from Mr. J. Patchell, the Secretary of the Company, stating that they were now ready to negotiate with the Board for the sale of the works, and that a Committee of the Directors would meet a Committee of the Board. After a prolonged discussion on the subject, it was decided to employ an engineer to inspect and report upon a site for an electric station and plant, also to give the estimated cost of the erection of new gas-works, and to value the present works. A Committee was appointed to carry out the terms of the resolution.

West Gloucestershire Water Company.—The half-yearly general meeting of this Company was held on the 30th ult.—Mr. E. Horton presiding. The Directors reported that the accounts for the six months ending June 30 showed a net profit of £1924, which, added to the amount brought forward, made £2099 available for distribution. The Directors recommended the declaration of a dividend (less income-tax) at the rate of 4 per cent. per annum on the shares under the Act of 1884, and of £2 16s. on the shares under the Act of 1887. This would absorb £1905, and leave a balance of £194 to be carried forward. The Chairman, in moving the adoption of the report, referred to the extension of the Company's powers under their Act of last session, by which their area had been greatly enlarged, and they had obtained authority to raise capital to the amount of £60,000, including premiums, carrying not more than 7 per cent. dividend. The past summer had been a very trying one for the Company. The prolonged drought had tested their resources to the utmost; but he was glad to say that their source at Frampton had not been appreciably affected. The Directors regretted that for a time part of the district had been without a continuous supply; but steps had been taken to prevent a recurrence of that state of things. It had been decided to spend £23,000 on plant and mains; and the work was well in hand. It was proposed to raise additional capital for the purpose. The report was adopted.

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Gas and Electric Lighting at Stafford.—The Stafford Corporation have adopted a report of the Lighting Committee recommending an application for a Provisional Order to enlarge the borrowing powers of the borough by £40,000 for gas and electric lighting purposes.

Gas-Meter Rents at Carlisle.—The question of the abolition of gas-meter rents in Carlisle is coming to the front. Mr. Burns has given notice of a motion on the subject for the next meeting of the Town Council. It was stated at a meeting in St. Mary's Ward last Thursday that the abolition would cost £800 to £1000 a year.

Water Scheme for Cumberland.—A meeting of representatives of the Aspatria, Holme Cultram, and Wigton Councils, for the furtherance of the Overwater scheme, to which reference has been made in the "JOURNAL," was held at Wigton last Tuesday. Mr. Pickering, the Engineer, advised the continuation of the trunk main to Abbey Town, Kirkbride, &c., from Fletchertown, at a further expenditure of £4500; bringing the total cost of the main to £34,500. It was stated that it was almost impossible to get the Bill prepared in time for next session.

Subways for London Streets.—At the meeting of the Court of Common Council of the City of London last Thursday, applications were received from the Postmaster-General for permission to open all the main thoroughfares of the City for the purpose of laying conduits and providing manholes for access to the same, in pursuance of the Telegraph (Telephonic) Communication Act, 1899, and were referred to the Streets Committee, who were also asked, at the instance of Mr. Hollington, to consider the desirability of providing subways in the principal streets.

Damages for Wrongful Dismissal.—At the Sheerness County Court last Friday, Frank Mitchell sued the Sheppey Gas Company for £15 for wrongful dismissal—Mr. Blome Jones appeared for plaintiff; the defendants were represented by Mr. Copland. It appeared that two men, named Collins and England, left the Company's employ on the 21st of July and next day came for the wages due. When they received the money, they alleged that they were entitled to 6d. per day more. Mitchell, the Chief Clerk, who kept the wages-book, told the men to come again next morning, when Collins, a man of colour, was seen by Mr. Ross Stevens (one of the Directors), and it was decided to pay him the extra 6d. per day—the money being tendered to him at that time. About an hour later, Mitchell declared that Collins returned, and said another day was due to him. The money was paid to Collins, and Mitchell put 4s. in an envelope in the petty cash drawer for England when he should call for it. The payment to Collins of the 4s., or at least some money in a packet, was testified to by two persons in the office; and Collins also swore that he received the money. The defence was that no day's pay was due to Collins and England, and that when Collins was first spoken to he declared that he never had the 4s. Various witnesses were called to show that the men were not entitled to the day's pay; and England said there was no 4s. due to him. Further, he had not received the extra 2s. 6d. for the 6d. per day. Plaintiff was dismissed because he would not admit having entered 4s. as paid to Collins which it was alleged was not paid. The Judge held that he had been perfectly honest in the matter, and gave judgment against the Company for £15 and costs.

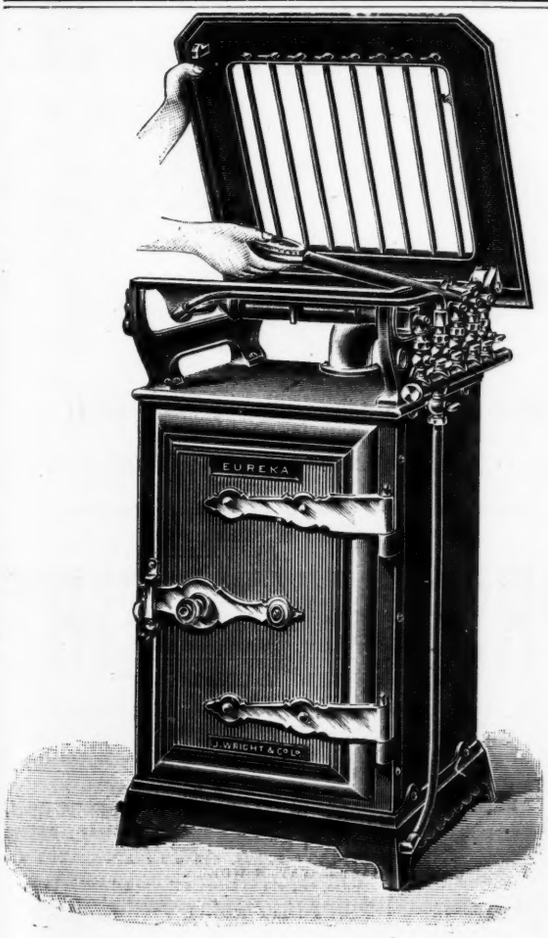
Wakefield Water Supply.—Without any public ceremony, the water of the Green Withers reservoir of the Wakefield Corporation, which has been constructed at a cost of about £120,000, has been turned on for consumption in the borough.

Water Scheme for Enfield.—The Enfield District Council, who have jurisdiction over 12,600 acres and a fast-growing population, are debating a scheme for ensuring a water supply for this large area. The present supply is obtained from the Lea Valley; but it is regarded as quite inadequate for the present needs of the place, and with the population increasing at the rate of more than 1000 a year, the Council have decided that it is imperative something should be done soon. The new scheme provides for the sinking of wells and the erection of engine-houses between Enfield and Potter's Bar, at an estimated cost of £38,000.

Darlington Corporation Water-Works.—Mr. Charles Hawksley is to be instructed to prepare plans and specifications for additional pumping-plant at the Darlington Corporation Water-Works. It is expected that the work will cost between £9000 and £10,000. The profit for the past half year amounted to £3273, which was £189 more than in the corresponding period of last year, and is the largest net income yet received from the department. The gross rents for water amounted to £6363. The total quantity of water pumped during the half year was 147,792,000 gallons for manufacturing, and 134,898,000 gallons for domestic purposes, or an average of 60½ gallons per head.

The Maidenhead Corporation and the Water-Works.—At the last monthly meeting of the Maidenhead Corporation, the Water Committee reported that, in accordance with the decision of the Council on the 18th ult., a communication had been addressed to the Directors of the Water Company, stating that the Council were desirous of acquiring the undertaking, and asking whether the Directors would enter into negotiation for its sale or purchase. A reply had been received stating that the Company were not disposed to sell, and, further, that they were about to apply to the Board of Trade for a Provisional Order to authorize an increase of capital. The Committee recommended that Messrs. Sharpe, Parker, and Co., the Parliamentary Agents for the Association of Municipal Corporations, should be consulted before taking any further steps. The report was adopted.

Bolton Water Supply.—At the monthly meeting of the Bolton Town Council last Wednesday, Alderman Cannon, the Chairman of the Water Committee, stated that it was necessary, in view of the growing demand for water, that they should look out for an additional source of supply. Experiments were now proceeding; but, of course, nothing would be done without the Council being taken into the confidence of the Committee. From inquiries made by our Bolton correspondent, it appears that the Water Committee have had under consideration various sites as a new source of supply; but the one most favoured is that of the head waters of the River Hodder, which is the principal tributary of the Ribble, and some 40 miles from Bolton. Extensive surveys and experimental borings have been made there, under the direction of Mr. R. H. Swindlehurst, the Water Engineer to the Corporation. This watershed already supplies the needs of Preston and Blackburn.



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Stockport Water-Works Transfer.—Under the powers obtained last session, the Stockport Water Company's works passed into the hands of the Corporation on the 30th ult.

An Ill-Fated Water Scheme at Winsford.—Last Wednesday, Mr. G. W. Willcocks, one of the Local Government Board Inspectors, held an inquiry at Winsford relative to the application by the Urban District Council for sanction to borrow £400 to pay off debts incurred in connection with the water borehole which has been the subject of much criticism in Mid-Cheshire. It was commenced three years ago, and carried to a depth of 1490 feet at an expense of close upon £2000, without obtaining a yield of water. Some two months ago the scheme was practically abandoned.

Ilfracombe Water Supply.—A meeting of the Ilfracombe District Council was held on Thursday to consider the desirability of promoting a Bill next session to authorize the construction of additional water-works. Some opposition was shown to the scheme. Mr. Hooper predicted that it would necessitate an addition of 1s. 3d. in the pound to the rates; and he proposed an amendment with the object of staying further proceedings. This, pending a poll of the ratepayers, was ruled out of order; the Clerk explaining that a poll would have to be taken. The resolution authorizing the application to Parliament was carried.

The New Nidd Water-Works of the Bradford Corporation.—On Tuesday last week, a Bradford paper announced that the heavy rains of the previous few days had produced very marked effects in the Nidd Valley. At the Gouthwaite compensation reservoir, the water had risen against the masonry dam to within 2 ft. 6 in. of the overflow; and the flood thus held back formed a lake above two miles long, and extending up the valley as far as Ramsgill. About 1300 million gallons of water were impounded in the reservoir, and the outlet sluices were discharging it at the rate of 180 million gallons per day. The masonry of the dam, it was mentioned, was standing the severe test very well, and had proved to be absolutely sound. On Wednesday, the weather was fine, and the stress was somewhat relieved; but for some hours upwards of 400 million gallons of water passed through the lower gauges and over the overflow gauges of the embankment. The workmen and all concerned had been fully prepared for the filling of the reservoir; but the heavy rains and the consequent quick rise of the waters led to a rather more expeditious decampment than usual of those engaged in the undertaking.

Cape Town and District Water-Works Company.—The ordinary general meeting of this Company was held on the 3rd inst., at the London Offices—Mr. J. S. Prince in the chair. In moving the adoption of the report and the payment of the dividend recommended (12 per cent., with a carry-forward of £1304), he said he had again to congratulate the shareholders on the continued progress and success of the Company. The gross revenue for the year ended June 30 last had been £21,400, as compared with £19,409 in the preceding year; and the net revenue derived from the sale of water showed an increase of £1766, notwithstanding that a great many applications for supplies had been refused in consequence of the negotiations pending with the Municipalities as to taking over the property, the local Board having on that account refrained from any additional expenditure on mains, &c., where it was not necessary. The number of houses supplied during the year had been 3983, or an increase on that of the previous year of 368. This was in addition to the 2350 houses in district No. 1 of Woodstock, which the Company supplied in bulk. The number of houses in the two districts of Woodstock was 4820. The expenditure on capital account during the year had been £1490. The yield from the springs had continued satisfactory, and the supply of water was more than ample for present requirements. All the works, buildings, &c., of the Company had been maintained in thoroughly efficient working order and repair. With regard to the acquisition of the undertaking by the Municipalities, it was expected that the arbitration would take place soon, and the award be given before the end of the year. He testified to the great assistance the Directors had at all times received from the staff generally in the administration of the Company's affairs in South Africa, especially during the past year. Mr. Ohlsson, the Chairman of the local Board, in seconding the motion, stated, in regard to the arbitration, that they had been successful in obtaining the assistance as Umpire of Mr. Kotze, the late Chief Justice of the Transvaal; and whatever the award might be, he was convinced that it would be satisfactory to the shareholders. The motion was unanimously adopted.

The Divining-Rod Again.—At Hallen, near Bristol, a successful find of water by the aid of the divining-rod has just been achieved. The "finder" indicated the spot; and water was found at a depth of 25 feet from the surface.

The Lighting of Rural Parishes.—Writing on the above subject, the "Local Government Journal" says: "The Local Government Act, 1894, confers upon the parish meetings of rural parishes the exclusive power of adopting, among other adoptive Acts, the Lighting and Watching Act of 1833; but, owing to the difficulty of construing this peculiar enactment, legal guidance is practically essential if the electors of a parish wish their proceedings to be regular. One of the chief obscurities is as to the majority required to effect a valid adoption. From an opinion expressed by the Local Government Board on this point, it seems that if a poll is taken upon the question, it is necessary that a clear majority of the parochial electors should vote, and that two-thirds of the persons voting should vote for the adoption. If, however, no poll is demanded and taken, and the question is decided by the parish meeting, a majority consisting of two-thirds of the votes of the electors present is sufficient. An alternative to procedure under the Lighting Act is afforded by sections 161 and 229 of the Public Health Act, 1875, under which the Rural District Council can obtain powers for the lighting of any rural parish at the cost of its own special rates. In this case the opinion of the electors need not be taken."

Sales of Shares.—At Leeds, on the 26th ult., Messrs. Hollis and Webb sold a quantity of stock and shares in industrial undertakings; and among the lots, £250 of "A" stock in the Drighlington and Gildersome Gas Company was disposed of at £180 per cent., £400 of "B" stock at £126 per cent., and 28 new shares at £3 10s. each; 500 shares in the Holyhead and North Wales Gas Company were also sold at 16s. apiece. On the same day, Messrs. Sadler and Baker sold 1000 additional ordinary £2 10s. shares (7 per cent.) in the York Town and Blackwater Gas Company, at prices ranging from £3 12s. 6d. down to £3 each. On the 28th, Messrs. R. Waterman and Sons disposed of 30 £5 shares in the Sutton Valence Gas Company, Limited, at prices ranging from £4 10s. to £4 15s. each. One £50 bond (5 per cent.) in the same Company, issued on July 1, 1880, realized £50. At the same auction, £24 of consolidated stock in the Maidstone Gas Company fetched £62 10s. On the 29th, 20 £4 shares in the Stirling Gas Company were offered for sale by auction in two lots. Ten shares were sold at £9 4s. each, and the others at £9—the upset price. Last Tuesday, Messrs. Jones and Son sold some ordinary £5 shares in the Llangollen Gas Company at prices ranging from £8 2s. 6d. to £8 10s. apiece. Three lots of £50 of stock of the Crediton Gas Company were sold by auction on Thursday at from £75 to £76 each.

The Gas Committee of the Newcastle-under-Lyme Corporation have accepted the tenders of Messrs. R. & J. Dempster, Limited, for a wrought-iron roof and a retort-bench for the retort-house at the gas-works.

The Colwyn Bay District Gas Company have placed an order with Messrs. R. Dempster and Sons, Limited, of Elland, for a new lime-store and roofing over the existing purifiers. The work is to be carried out to the plans of the Company's Engineer, Mr. J. C. Pennington.

Messrs. Clay and Walmsley, of Bolton, have recently received an order from a large Gas Company in the South of England for about 1500 of their new "floating bunsen" anti-vibratory fittings for Kern incandescent gas-burners.

It will be seen by an announcement which appears elsewhere, that Mr. Alfred Richards will shortly offer for sale, at the Mart, Tokenhouse Yard, some £10 shares in the Grays Gas Company, £5000 of ordinary stock of the Southend Gas Company, £7500 of new ordinary stock of the Wandsworth and Putney Gas Company, and stock of the Aldershot, Caterham, and other gas companies; also £9000 of debenture stock of the Southend Water Company.

Two Provincial Gas Companies are about to issue new stock, as announced in another part of the "JOURNAL." At Eastbourne, Messrs. Easter and Wright will offer to public auction, next Monday, 1200 new "B" £10 shares in the Eastbourne Gas Company; and on the 7th prox., Mr. G. H. Petty will, in accordance with instructions of the Directors, submit for competition sufficient new ordinary 7 per cent. stock of the Morecambe Gas Company to produce £10,000.

NOTICE TO ADVERTISERS.—COPY FOR ADVERTISEMENTS for the "JOURNAL" should be received at the Office *not later* than TWELVE O'CLOCK NOON ON MONDAY, to ensure insertion in the following day's issue.

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BUYERS of Spent Oxide. Sellers of OXIDE OF IRON and SULPHURIC ACID.

PATENTS FOR INVENTIONS.
Messrs. J. C. CHAPMAN & CO., Chartered Patent Agents, ADVISE ON ALL MATTERS CONNECTED WITH ABOVE.
Information and Handbook on application.
70, CHANCERY LANE, LONDON, W.C.

SPENT OXIDE wanted.
BROTHERTON AND CO., Chemical Manufacturers.
Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

SPECIAL PAINT FOR GAS-WORKS.
JOHN E. WILLIAMS AND CO.,
VICTORIA PAINT WORKS,
MANCHESTER.
Telegrams: "ENAMEL." National Telephone 1769.

JOHN RILEY & SONS, Chemical Manufacturers, Hapton, near Accrington, are MAKERS of SULPHURIC ACID, from Brimstone, for Sulphate of Ammonia Making. Highest percentage of Sulphate of Ammonia obtained from the use of this Vitriol. References given to Gas Companies.

PRACTICAL RETORT SETTERS.
BATES & NUTTALL, 32, Havelock Road, Saltley, Birmingham.
Regenerator or other Furnaces erected to Engineers' own Designs. Best Work Guaranteed. Please write for Estimates.

MELROSE CYCLES
SHOULD be bought by Gas and Water Officials. Ladies' No. 1, £10 10s.; No. 2, £8 10s. Gents' No. 1, £10; No. 2, £8. Highest Quality. Twelve Months' Guaranty. Sent on approval. Catalogue free. MELROSE CYCLE COMPANY, COVENTRY.

SULPHURIC ACID for Sale.
BROTHERTON AND CO., Chemical Manufacturers.
Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

BENZOL, specially made for the Enrichment of Gas.
ELLISON AND MITCHELL, LIMITED, Kilnhurst, near ROTHERHAM.

GAS CARBON Wanted, not less than 4-Ton Loads.
Apply to the BRIMINGTON CARBON COMPANY, Sowerby Bridge, YORKS.

GAS TAR wanted.
BROTHERTON AND CO., Tar Distillers.
Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

GLOBE Chemical Works, Marple, near Manchester, Sell the most reliable and best OXIDE OF IRON for Purifying Gas. Purity and Quality guaranteed
Sellers of the best RETORT CEMENT. Best Price given for SPENT OXIDE.

IRON OXIDE (Bog Ore), best quality, for the Purification of Gas, containing up to 85 per cent. Hydrated Oxide of Iron, and absorbing while being used a high percentage of Blue.
S. BOWLEY AND SON, Wellington Works, Battersea Bridge, LONDON, S.W.

SULPHATE OF AMMONIA SATURATORS.

JOSEPH TAYLOR & CO., Chemical Plumbers, &c., and Makers of every description of Solid Plate Lead and Timber Cased Saturators, &c., CENTRAL PLUMBING WORKS, TOWN HALL SQUARE, BOLTON. Special attention to Repairs.
Before placing Orders, please write for Estimate.
Telegraphic Address: "SATURATORS, BOLTON."

ECONOMY IN PURIFICATION.

INCREASE the efficiency of your PURIFIERS by adopting CRIPPS'S PATENT BYE-PASS VALVE in the lower Tiers of Sieves. Practical Experience proves their Economy. Engineers are repeating orders after thorough trial.
References and Particulars can be obtained from the Makers—
C. & W. WALKER, LIMITED, Midland Iron-Works, Donnington, near Newport, SALOP.

ADVERTISER seeks position as COLLECTOR or CLERK and COLLECTOR to Gas or Water Company. Thorough knowledge of Office routine and Secretarial work. Highest References.
Address No. 3334, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, an Engagement by the Advertiser, a GAS MANAGER, with extensive Home and Colonial experience, who will be disengaged in the early part of the month of October. Well up in all the details of modern Gas-Works Construction and its Management, and the most approved Appliances introduced to economize the production of Gas and extend its use. Practically acquainted with both American and German Carburetted Water-Gas Plant and its manipulation. A good Draughtsman and Accountant. Satisfactory References and Testimonials.
Address No. 3332, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, at once, a Draughtsman, well up in Constructional Ironwork.
Apply to W. J. JENKINS AND CO., LIMITED, RETFORD.

WANTED, two good Fitters, used to Slot Meter, Stove, and General Trade.
Apply to the MANAGER, Gas Offices, CAMBRIDGE.

WANTED, immediately, a competent GAS-WORKS FITTER. Permanent Work, with good Wages. State Age and Experience.
Apply to H. SMYTHE, Gas-Works, MAIDSTONE.

WANTED, Stokers used to Exhauster. Wages £1 6s. per week. Single Men and Abstainers preferred.
Apply, with References, to A. E. BUCKLEY, Gas-Works, CORBRIDGE.

FITTER and General Working Assistant to the Manager required by the Ware Gas Company. Wages commencing 26s. per week.
Apply, stating Age and Experience, with Testimonials, to the SECRETARY, Gas Company, Ware, HERTS.

WANTED, a Situation as Working MANAGER by a thoroughly experienced Man. Can take Meters, lay Mains and Services, fix Stoves and Meters, and do general Fitting. Age 34. Married. First-class References. At present Foreman.
Address E. VANSTONE, Gas-Works, East Cowes, ISLE OF WIGHT.

CLEETHORPES GAS COMPANY.
WANTED, an experienced and energetic Man as TIME and FITTINGS CLERK, to take charge of the Distributing and Gas-Fitting Department.
Applications, with Testimonials (*copies only*), to be sent to the undersigned.
E. J. BROCKWAY,
Engineer and Secretary.

WANTED, a sober and steady Married Man as STOKER. Must understand all the duties of a small Gas-Works making 4 to 5 Millions. Wages 25s. per week, with House and Garden near the Works.
Apply, by letter, giving Age and Experience and *copy* of Testimonials, to No. 3357, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

HIGH WYCOMBE WATER COMPANY, LIMITED.
WANTED, by the above Company, a thoroughly steady and capable JOINTER and SERVICE LAYER (Iron). Wages £1 7s. per week. Married man preferred; and strictly reliable.
Apply, with *copies* only of Testimonials, to the undersigned.
J. FRED. WICKS, C.E.,
Engineer and Secretary.

GAS-FITTERS.
THE Chester United Gas Company have Vacancies for one or two GAS-FITTERS. Young Men preferred. Improvers may apply. Employment for a good Man will be constant. Wages to commence 28s. per week.
Apply, in own Handwriting, stating previous Experience and giving References, to the Manager and Engineer, Mr. J. C. BELTON, Gas-Works, CHESTER.

BOROUGH OF NELSON.
GAS ENGINEER.
THE Gas Committee require the Services of a thoroughly competent, practical, and experienced GAS ENGINEER at a Salary of £400 per annum, to take charge of a rapidly developing Gas-Works (200 million cubic feet made per annum).
Applications, in Candidates' own Handwriting, with full Particulars as to Age, Training, and Experience, accompanied by not less than Three *copy* Testimonials of recent date, endorsed "Gas Engineer," to be sent to me not later than Twelve o'clock noon, on Monday, Oct. 23.
Canvassing either directly or indirectly will be considered a disqualification.
By order,
R. M. PRESCOTT,
Town Clerk.
Town Hall, Nelson,
Oct. 9, 1899.

INCANDESCENT GAS MANTLES.
REQUIRED, to complete a collection showing the progress of the Incandescent Gas Industry, duly authenticated SPECIMENS of INCANDESCENT MANTLES as used in England in the Year 1892 (imported or otherwise). A Liberal Price will be paid for suitable authentic Specimens duly guaranteed, or Information leading to tracing them.
Address CURATOR, 117, CHANCERY LANE, W.C.

GAS-FITTERS wanted by a South of England Gas Company. Permanent Situations to good Men.
Send (by letter) Particulars of Experience and Wages to No. 3356, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

IRON ROOF for Sale, 132 feet long by 53 ft. 4 in. Span, in first-class condition.
Apply to CLAYTON, SON, AND CO., LIMITED, Hunslet, LEEDS.

ENGINE and Exhausters, 20,000 and 30,000 cubic feet per hour, delivered immediately. Cheap to clear.
J. F. BLAKELEY, Thornhill, DEWSBURY.

CAST Tank, 31 feet diameter, 12 feet deep, £4 15s. per ton. Straps and Bolts included. Five Years old.
J. F. BLAKELEY, Thornhill, DEWSBURY.

CARBON for Sale. About 4 Tons.
Apply to the STEWARD, Darenth Asylum, near Dartford, KENT.
Oct. 5, 1899.

GAS PLANT for Sale—I can always offer NEW and SECOND-HAND GAS APPARATUS, including Retorts and Fittings, Condensers, Exhausters, Scrubbers, Washers, Purifiers, Gasholders, Tanks, Valves, Connections, &c. Also a few COMPLETE WORKS. Compare Prices and Particulars before ordering elsewhere.
J. F. BLAKELEY, Gas Engineer, Thornhill, DEWSBURY.

TENDERS wanted for the supply and erection of a STEEL RING WEB GIRDER, 5 ft. 6 in. wide by about 300 ft. diameter, with Timber Work, &c.
The lowest or any Tender not necessarily accepted.
Offers by Oct. 20, 1899.
Particulars from MR. DAVID TERRACE, Manager, Corporation Gas-Works, MIDDLESBROUGH.

TO COLLIERY PROPRIETORS.
THE Directors of the Sheffield United Gaslight Company invite TENDERS for 25,000 Tons of GAS COAL to be delivered by the 30th of June, 1900.
Tenders (forms for which can be obtained on application) must be delivered to the undersigned by post, not later than the first post on Friday, the 20th inst.
The Directors do not bind themselves to accept the lowest or any Tender.
HANBURY THOMAS,
General Manager and Secretary.
Commercial Street, Sheffield,
Oct. 6, 1899.

ROCHESTER, CHATHAM, AND STROOD GASLIGHT COMPANY.
CAST-IRON PIPES.
THE Directors invite Tenders for the supply of 620 Tons of 24-inch and 130 Tons of 14-inch CAST-IRON SPIGOT and SOCKET PIPES and SUNDRY IRREGULARS, to be delivered during the month of March, 1900.
Particulars and Forms of Tender may be obtained from the undersigned, to whom sealed Tenders, endorsed "Cast-Iron Pipes," must be delivered on or before Noon of Wednesday, Oct. 18, 1899.
J. M. VEEVERS,
Engineer and Secretary.
Gas Offices, Rochester,
Oct. 5, 1899.

ISLE OF THANET GAS COMPANY, MARGATE.
CAST-IRON PIPES.
THE Directors of the above Company invite TENDERS for the supply of 1500 Yards of 6-inch and 800 Yards of 4-inch CAST-IRON SOCKET and SPIGOT PIPES, and SUNDRY IRREGULARS.
Further Particulars as to Time of Delivery, &c., may be had on application to the Engineer, Mr. James Dougall.
Tenders, endorsed "Cast-Iron Pipes," and addressed to the Chairman, must be delivered at these Offices on or before the 19th of October, 1899.
The Directors do not bind themselves to accept the lowest or any Tender.
By order,
THOS. C. FULLER, F.I.S.,
Secretary.
Offices: The Dane,
Margate, Oct. 7, 1899.

LEIGH URBAN DISTRICT COUNCIL.
(GAS DEPARTMENT.)
THE Gas, Water, and Electricity Committee of the above Council invite TENDERS for the removal of their surplus COKE.
Estimated quantity, about 2000 Tons.
To be removed in equal monthly quantities between the 1st of November, 1899, and the 31st of March, 1900.
Forms of Tender and Conditions forwarded on application to Mr. J. Foster, Manager, Gas-Works, Leigh, Lancs.
The Committee do not bind themselves to accept the highest or any Tender, or consider any Tender for a quantity less than 300 Tons; and further reserve to themselves the right to allot the quantity offered in such quantities as they may think fit.
Sealed Tenders, endorsed "Coke," to be delivered to the undersigned on or before Twelve o'clock noon, on Saturday, the 14th day of October, 1899.
PEREGRINE THOMAS,
Clerk and Solicitor,
Town Hall, Leigh, Lancs.,
Oct. 2, 1899.

IMPORTANT SALE OF GAS SHARES.

THE Directors of the Eastbourne Gas Company have instructed

Messrs. EASTER & WRIGHT

to Sell by Auction at Mr. J. C. Towner's Auction Mart, Eastbourne, on Monday, the 16th of October, 1899, at Three o'clock precisely, 1200 NEW "B" SHARES at £10 each in 240 Lots. The sale is made under the provisions of the Company's Special Act.

Particulars and Conditions of Sale may be obtained of the undersigned or of the Auctioneers, Eastbourne.

J. H. CAMPION COLES,
Secretary and Solicitor to the Company.

Eastbourne.

SALES BY AUCTION OF GAS AND WATER STOCKS AND SHARES.

MR. ALFRED RICHARDS begs to notify that his AUCTIONS of STOCKS and SHARES in London, Suburban, and Provincial Gas and Water Companies are held PERIODICALLY, at the Mart, Tokenhouse Yard, E.C.

He also undertakes the issuing by Auction of Gas and Water Stocks and Shares under Parliamentary Powers.

Terms for issuing such Capital, and also for including Gas and Water Stocks and Shares in these Periodical Sales, can be obtained on application at Mr. ALFRED RICHARDS'S OFFICES, No. 18, FINSBURY CIRCUS, E.C.

By order of the Directors of the
SOUTHEND WATER-WORKS COMPANY.

£9000 FOUR PER CENT. PERPETUAL DEBENTURE STOCK.

MR. ALFRED RICHARDS will Sell THE ABOVE BY AUCTION, at the Mart, E.C., on Tuesday, the 17th of October, at Two o'clock, in Lots.

Particulars of the AUCTIONEER as above.

By order of the Directors of the
ALDERSHOT GAS AND WATER COMPANY.

130 £10 PREFERENCE SHARES.

TO be Sold by Auction by Mr. Alfred RICHARDS, on Tuesday, the 17th of October, at Two o'clock, in Lots.

Particulars at the AUCTIONEER'S OFFICES.

By order of the Directors of the
CATERHAM AND DISTRICT GAS COMPANY.

250 £10 PREFERENCE SHARES.

MR. ALFRED RICHARDS will Sell THE ABOVE BY AUCTION, at the Mart, on Tuesday, the 17th of October, at Two o'clock.

Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

By order of Trustees and Others.
HARROW AND STANMORE GAS COMPANY.
48 £10 FULLY-PAID "A" & "C" SHARES.

KING'S LYNN GAS COMPANY,
£310 ORDINARY STOCK.

SUNBURY GAS COMPANY.
50 £5 SHARES.

TO be Sold by Auction, by Mr. Alfred RICHARDS, at the Mart, on Tuesday, the 17th of October, at Two o'clock.

Particulars as above.

By orders of the Directors of the
SOUTHEND GAS COMPANY.

ISSUE OF £5000 ORDINARY STOCK.

MR. ALFRED RICHARDS will Sell THE ABOVE BY AUCTION, at the Mart, E.C., on Wednesday, the 25th of October, at Two o'clock, in Lots.

Particulars at the AUCTIONEER'S OFFICES.

By order of the Directors of the
GRAYS GAS COMPANY, LIMITED.

400 £10 SHARES.

MR. ALFRED RICHARDS will Sell BY AUCTION, on Wednesday, the 25th of October, at Two o'clock,

400 £10 "B" SHARES,

in the above Undertaking.

Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS.

SOUTH-WEST SUBURBAN WATER COMPANY.
SIXTY £10 ORDINARY SHARES and 108 £10 FIVE PER CENT. PREFERENCE SHARES.

PORTSEA ISLAND GAS COMPANY.
SIX £50 FULLY-PAID "B" SHARES.

TO be Sold by Auction by Mr. Alfred RICHARDS, at the Mart, E.C., on Wednesday, the 25th of October, at Two o'clock.

Particulars of the AUCTIONEER as above.

By order of the Directors of the
WANDSWORTH AND PUTNEY GASLIGHT AND COKE COMPANY.

NEW ISSUE OF £7500 ORDINARY STOCK.

MR. ALFRED RICHARDS will Sell BY AUCTION, at the Mart, E.C., on Tuesday the 7th of November, at Two o'clock, in Lots.

£7500 OF NEW ORDINARY SEVEN PER CENT. STOCK

in the above Undertaking.

Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

BOROUGH OF HEYWOOD.

THE Gas Committee invite Tenders for the supply of WET and DRY GAS-METERS.

Specification and Form of Tender may be obtained from Mr. W. Whatmough, Gas Manager.

Contractors tendering for this work must pay their workpeople at least the Standard or Trade Union Rate of Wages, and observe the Trade Conditions which attach to the various kinds of work for which the Tender is sent in.

Tenders, endorsed "Gas-Meters," to be sent to me not later than Tuesday, Oct. 17, 1899.

By order,
J. H. BALDWICK,
Town Clerk.

Municipal Buildings, Heywood,
Sept. 28, 1899.

COUNTY BOROUGH OF BURNLEY.
(GAS DEPARTMENT.)

THE Gas Committee of the Burnley Corporation are prepared to receive TENDERS for the erection of BUILDINGS and PLANT for the Manufacture of CARBURETTED WATER GAS, as follows:—

1. Excavator, Mason, and Bricklayer.
2. Wrought-Iron Roof.
3. Slater.
4. Cast-Iron Cistern.
5. Steam-Boilers.
6. Engines, Generators, &c., for the manufacture of Carburetted Water Gas.

Specifications, Bills of Quantities, and Forms of Tender may be obtained, on application to the undersigned, on and after Friday, the 6th of October.

Tenders, suitably endorsed, to be sent in, addressed to the Chairman of the Gas Committee, Town Clerk's Office, Burnley, on or before Wednesday, the 18th of October, 1899.

JNO. P. LEATHER.

Gas-Works, Burnley,
Sept. 29, 1899.

MORECAMBE GAS AND LIGHT COMPANY.

TO be Sold by Auction, by Mr. G. H. PETTY, pursuant to Instructions of the Directors of the Morecambe Gas and Light Company, at the Company's Offices, Market Street, Morecambe, on Tuesday, the 7th day of November, 1899, at Three o'clock in the Afternoon prompt, subject to conditions to be then produced,

NEW ORDINARY STOCK

sufficient to produce, with the Premiums thereon, the sum of £10,000, being part of the amount of £16,000 authorized by the Morecambe Gas Order, 1899.

The Stock will rank for a Standard Dividend of 7 per cent., subject to the Sliding-Scale. For the Year ending the 30th of June last, the Ordinary Stock received a dividend of 4 per cent. above the Standard Dividend, and on the present Price of Gas a Dividend up to 5½ per cent. above the Standard Dividend may be paid if earned.

The Stock will be offered in lots of £100 each.

For Particulars apply to the Auctioneer, 62, Market Street, Lancaster; Mr. W. Duff, Secretary and Manager of the Morecambe Gas and Light Company; or to Messrs. Clark, Oglethorpe, and Sons, Solicitors, Lancaster and Morecambe.

By order of the Directors,
WILLIAM DUFF,
Secretary.

Market Street, Morecambe,
Oct. 5, 1899.

BRIGHTON AND HOVE GENERAL GAS COMPANY—£720 ORIGINAL STOCK. Last Dividend 11½ per cent.

SOUTHAMPTON GASLIGHT AND COKE COMPANY—£1100 FIVE PER CENT. ORDINARY STOCK.

WANDSWORTH AND PUTNEY GASLIGHT AND COKE COMPANY—£100 "C" STOCK. Last Dividend 12½ per cent.

MITCHAM AND WIMBLEDON DISTRICT GAS-LIGHT COMPANY—£200 "A" ORDINARY STOCK. Last Dividend 10 per cent.

MESSRS. EDWIN FOX & BOUSFIELD will include the above STOCKS in their next Stock and Share Auction at the Mart, E.C., on Wednesday, Oct. 18, at Two o'clock, in Lots.

Particulars at the AUCTIONEER'S OFFICE, 99, Gresham Street, BANK, E.C.

THOMAS TURTON AND SONS, LIMITED,
SHEAF WORKS, SHEFFIELD,
MANUFACTURERS OF
FILES OF BEST QUALITY
FOR ENGINEERS.
STEEL OF ALL DESCRIPTIONS.
SCREW STOCKS, TAPS AND DIES,
SPANNERS, RATCHET BRACES, LIFTING JACKS,
ANVILS, VICES,
AND ENGINEERS' TOOLS GENERALLY.
LONDON OFFICE:
90, CANNON STREET, E.C.

"GAS, AND HOW TO USE IT."

A useful little Brochure, suitable for Distribution among Gas Consumers in the District of any Gas Company

BY

J. H. TROUGHTON.

Sample Copies 6d. *each.*

100, £2; 250, £4 10s.; 500, £7 10s.; 1000, £10.

The Pamphlet can be specialized to suit the Price of Gas and other Conditions of supply in any particular District, at a slightly increased Charge.

Prices for larger quantities of the Publisher:
WALTER KING, 11, BOLT COURT, FLEET STREET, E.C.

NITRATE of Thorium and Cerium. FABRIK CHEMISCHER PRAEPARATE VON STHAMER, NOACK, AND CO., HAMBURG.

ENRICH YOUR GAS
WITH CHEAP
BENZOL.
SPECIALLY PREPARED, FREE FROM SULPHUR.

AT to-day's Price of Benzol, Illuminating POWER costs less than ONE-THIRD OF A PENNY PER CANDLE.

Apply to SADLER & CO., MIDDLESBROUGH.

THOMAS DUXBURY & CO.,
16, DEANSGATE, MANCHESTER.
GAS ENGINEERS' AGENTS AND CONTRACTORS FOR
Meters, Fire-Clay Goods, Oxide of Iron, and all other Gas Apparatus. Retort Carbon purchased.
Inquiries Solicited.
Telegrams: "DARWINIAN, MANCHESTER."
Telephone 1806.

THORNLEY GAS COALS
WORKED BY THE
WEARDALE IRON & COAL Co., Ld.
OUT OF THEIR
THORNLEY AND WHEATLEY HILL COLLIERIES.

Analysis made by
Messrs. J. & H. S. PATTINSON.

Yield of Gas per Ton	10,500 Cub. Ft.
Illuminating Power	16·9 Candles.
Coke (of good quality)	67·5 per Cent.
Sulphur	0·58 ,,
Ash	2·73 ,,

For Price, &c., apply to the
WEARDALE IRON & COAL Co., Ld.
QUAYSIDE, NEWCASTLE-ON-TYNE.

WELDON MUD
FOR
GAS PURIFICATION.
For use in the
RECOVERY OF SULPHUR,
ALSO
Removal of last Traces of SULPHURETTED HYDROGEN in catch position.

Full Particulars on application to the Patentees:
GAS DESULPHURIZATION CO.,
— *LIMITED,* —
1, FENCHURCH AVENUE, LONDON, E.C.

TROTTER, HAINES, & CORBETT,
Brettell's Estate
FIRE-CLAY & BRICK WORKS,
STOURBRIDGE.

Manufacturers of GAS-RETORTS, GLASSHOUSE FURNACE & BLAST-FURNACE BRICKS, LUMPS, TILES, and every description of FIRE-BRICKS.
Proprietors of
BEST GLASSHOUSE POT & CRUCIBLE CLAY.
SHIPMENTS PROMPTLY AND CAREFULLY EXECUTED.

LONDON OFFICE: R. CULL, 34, OLD BROAD STREET, E.C.

LONDONDERRY GAS COALS
FROM THE
MARQUIS OF LONDONDERRY'S COLLIERIES,
COUNTY OF DURHAM.
Available Output up to 5000 Tons per day.
Yield of Gas 11,000 cubic feet per Ton of Coal as per Analysis by
Mr. John Pattinson, F.C.S., F.I.S.

FOR PRICES AND PARTICULARS, APPLY TO
S. J. DITCHFIELD,
SEAHAM HARBOUR, COUNTY OF DURHAM.

HOLMSIDE
GAS COALS.
Present Daily Produce over 5000 Tons.
Latest Analysis—By CHARLES PHILLIPS, Gas Examiner to Rotherham Corporation

Yield of Gas per Ton . . . 11,205 Cubic Feet.
Illuminating Power $16\frac{7}{10}$ Stand. Sperm. Candl.
Coke (of good & pure quality) $13\frac{3}{4}$ Cwt. per Ton.
Sulphur . . . . . A little over 1 per Cent.
Ash . . . . . Under 1 per Cent.
Tar . . . . . 163 lbs. (Avoir.) per Ton.
Ammoniacal Liquor 103 lbs. (Avoir.) per Ton.

HOLMSIDE GAS COALS are supplied to the largest Gas Companies in England and on the European Continent; London alone consuming about half the produce.

SOUTH MOOR
PELTON GAS COALS.
Present Daily Produce available 3000 Tons.
Of equal quality to the "Holmside" Coal, and also very largely used by many Gas Companies at Home and Abroad.
Both descriptions are shipped at Tyne Docks, and Dunston Staiths, River Tyne, also at North and South Docks, Sunderland.
These Coals may be bought through the Principal Merchants in England, or direct from
MR. MARK ARCHER,
HOLMSIDE & SOUTH MOOR OFFICES,
NEWCASTLE-UPON-TYNE.

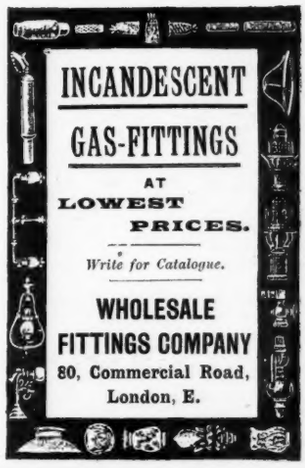
BOLDON GAS COALS.
ANALYSIS.

Yield of Gas per Ton. .	10,500	Cubic Feet.
Illuminating Power . .	16·9	Candles.
Coke	66·7	Coke.
Sulphur	0·86	Sulphur.
Ash	2·04	Ash.

For Prices, &c., apply to
W. H. PARKINSON,
THE HARTON COAL CO., LTD.,
NEWCASTLE-ON-TYNE.
Telegraphic Address: "PARKINSON, NEWCASTLE."

Do not throw away any more of your
ASHES
OF
INCANDESCENT MANTLES
Buyers are
OBERFELT & CO., BERLIN,
Manufacturers of Incandescent Burners.

JAMES OAKES & CO.
ALFRETON IRON-WORKS, DERBYSHIRE,
AND
Wenlock Iron Wharf, 21 & 22, Wharf Road, CITY ROAD, LONDON, N.,
Manufacture and keep in Stock at their Works (also large stock in London)
PIPES and CONNECTIONS, $1\frac{1}{2}$ to 48 inches in diameter, and make and erect to order RETORTS, PURIFIERS and TANKS, with or without planed joints, COLUMNS, GIRDERS, SPECIAL CASTINGS, &c., required by Gas, Water, Railway, Telegraph, Chemical, Colliery, and other Companies.
NOTE.—Makers of HORSLEY'S PATENT SYPHONS. These are cast in one piece, without Chaplets; doing away with Bolts, Nuts and Covers, and rendering Leakage impossible.



NEWBATTLE CANNEL.
Highest Results in Gas, & Excellent Coke.
QUOTATIONS ON APPLICATION TO
THE LOTHIAN COAL COMPANY,
LIMITED,
NEWBATTLE COLLIERIES,
DALKEITH N.B.

UNEQUALLED.
Gas Companies are solicited to try Samples of the
MIRFIELD
BLACK BED GAS COAL.
Prices and Analysis on application.
MIRFIELD (GAS-COAL) COLLIERY COMPY.
RAVENSTHORPE, NEAR DEWSBURY.

Awarded HIGHEST MEDAL and DIPLOMA at the Newcastle-on-Tyne Royal Mining and Industrial Exhibition, 1887, for
CANNEL & COAL.

TYNE
BOGHEAD CANNEL.

Yield of Gas per ton	13,155 cub. ft.
Illuminating Power	38·22 candles.
Coke per ton	1,301·88 lbs.

EAST PONTOP GAS COAL.

Yield of Gas per ton	10,500 cub. ft.
Illuminating Power	17·3 candles.
Coke	70 per cent.

SOUTH PELAW MAIN GAS COAL.

Yield of Gas per ton	10,500 cub. ft.
Illuminating Power	16·3 candles.
Coke	73·1 per cent.

For Prices and complete Analysis, apply to
THOS. W. DANCE & SONS,
COAL OWNERS, NEWCASTLE-ON-TYNE;
OR
E. FOSTER & CO.,
21, JOHN STREET, ADELPHI, LONDON, W.C.

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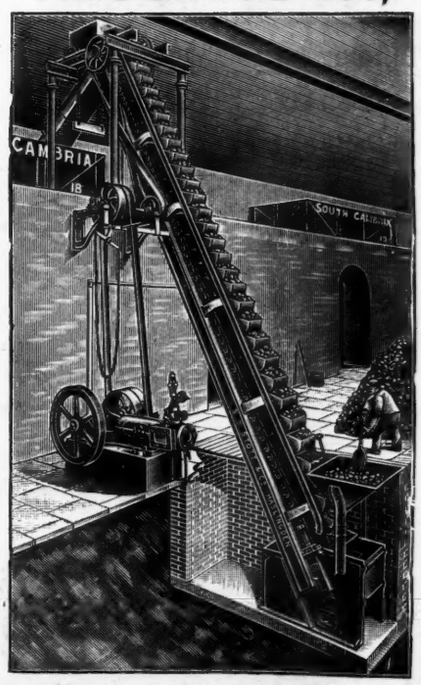

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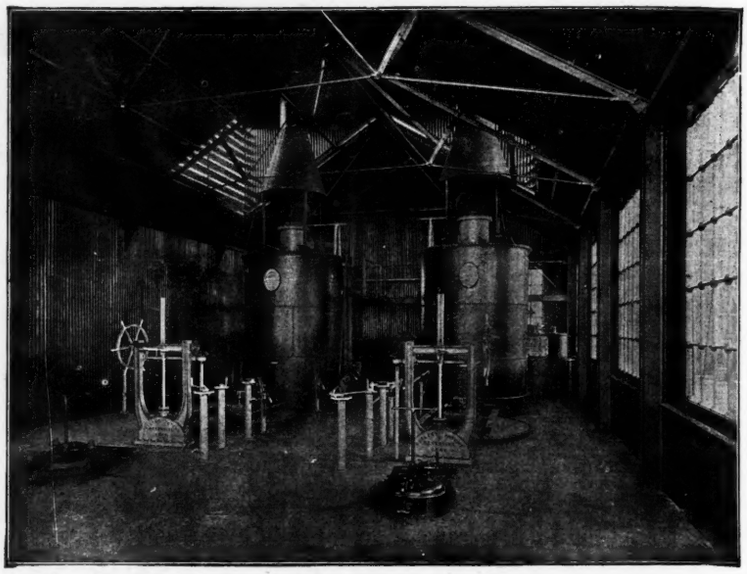
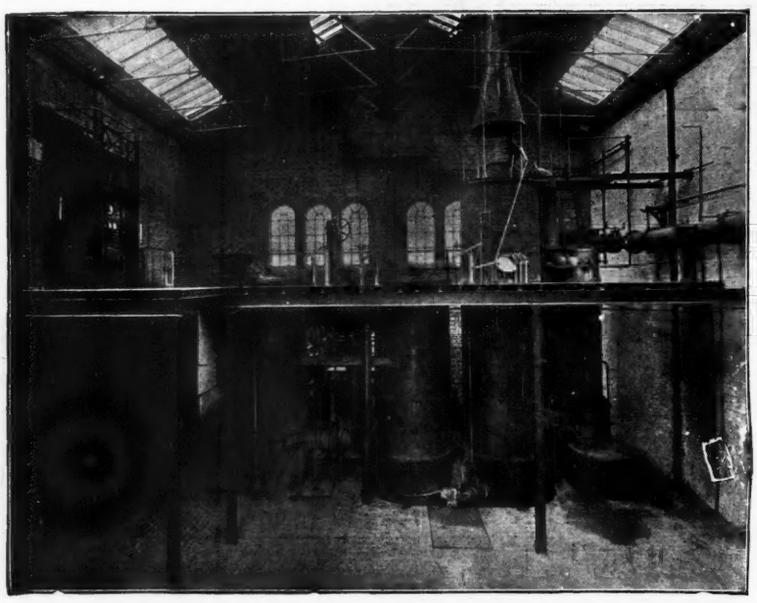


Water-Gas Plant at Southall.



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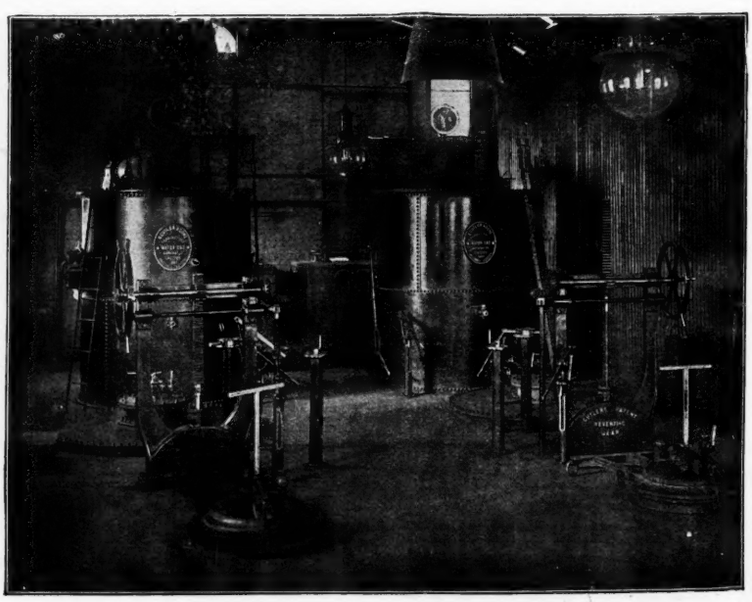
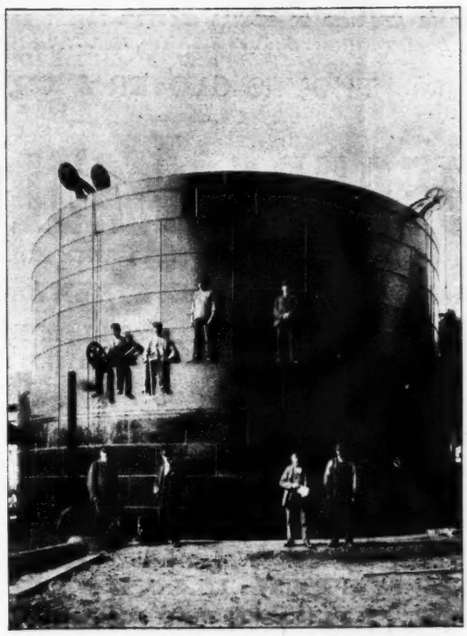


Water-Gas Plant at Southend.



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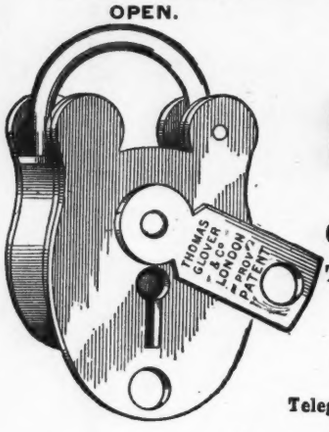

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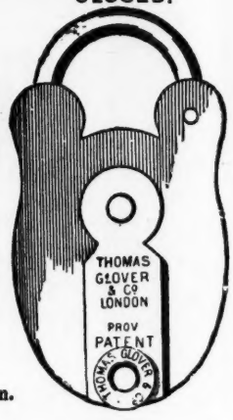

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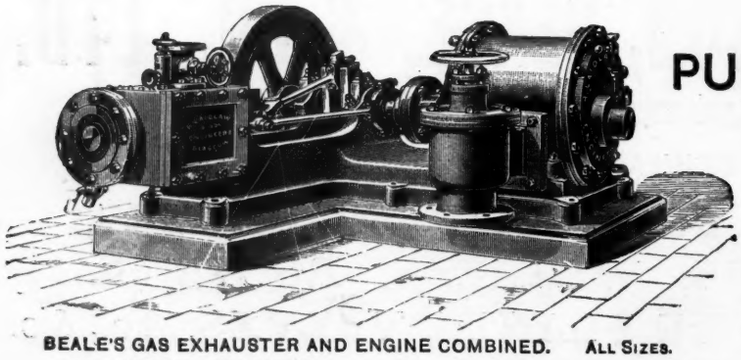

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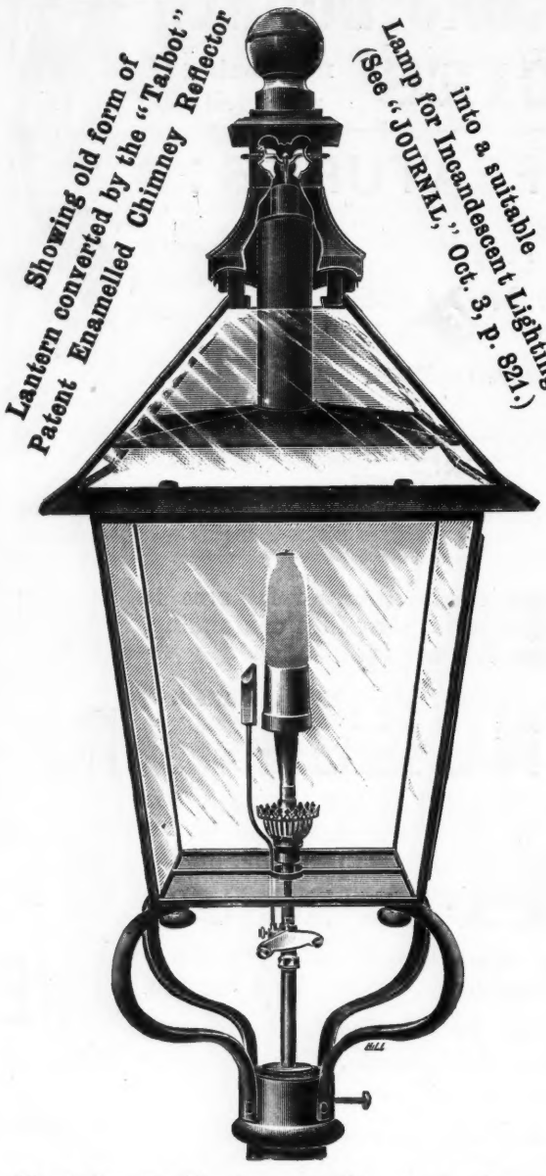

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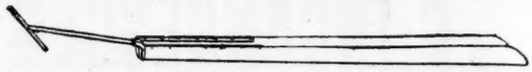

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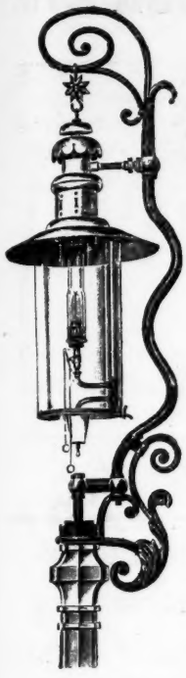

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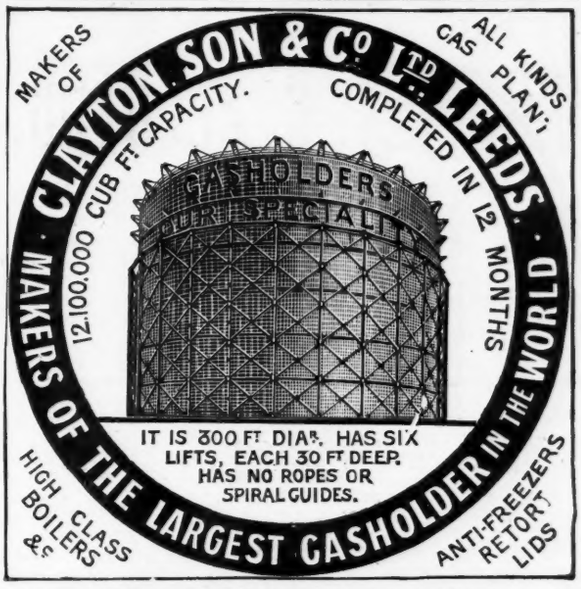
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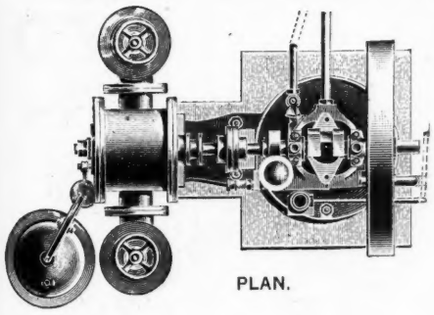
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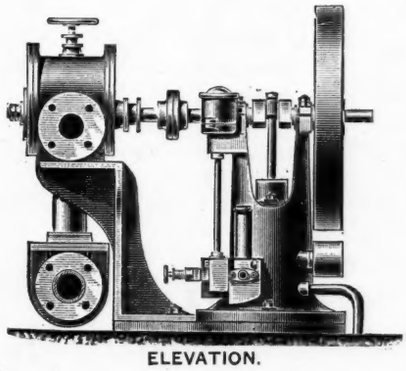
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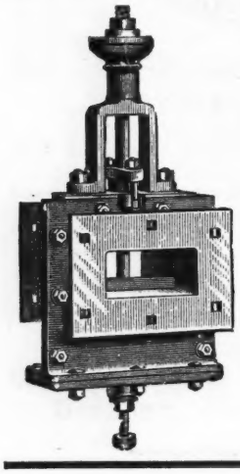

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